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# USSR Report

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USSR REPORT  
CHEMISTRY

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ADSORPTION

UDC 541.182

ADSORPTION OF NONIOGENIC SURFACTANTS ON KAOLINITE IN AQUEOUS SYSTEMS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 10, 1985  
(manuscript received 29 May 84) pp 1018-1020

OVCHANRENKO, F.D., POTABENKO, V.S. and VDOVENKO, N.V., Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] In order to increase the compatibility of mineral fillers with polymers, studies were conducted on the modification of kaolinite by adsorption of alkyl esters of polyethylene glycols from aqueous solutions. The esters ranged in MW from 1,150 to 10,000 and were mixed with kaolinite (1 g/25 ml of surfactant) at 20°C for 3 days with constant mixing. Analysis of adsorption parameters and changes in the zeta potential of kaolinite demonstrated that it is possible to determine the thickness of the adsorbed ester with considerable accuracy, as well as the extent of adsorption and the disposition of the adsorbed molecules. Adsorption data in relation to MW of the surfactants, thickness of the adsorbed layer to the degree of adsorption, and changes in the electrokinetic potential are summarized in graphic forms. Figures 3; references 14; 7 Russian, 7 Western.  
[194-12172]

UDC 661.183.123

REVERSIBLE AND SELECTIVE BONDING OF PROTONS ON HETEROGENEOUS-LATTICE CARBOXYL CATIONITES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 9, Sep 85  
(manuscript received 4 Mar 85) pp 2074-2078

VOLSKIY, V.S., SHATAYEVA, L.K. and SAMSONOV, G.V., Leningrad Chemical-Pharmaceutical Institute

[Abstract] This work presents a comparison of the adsorption properties of acrylic and methacrylic carboxyl cationites with respect to endopolygalacturonase (EPG) which has affinity for the carboxyl groups of the substrate-polygalacturonic acid and for highly purified proteins having no biospecific

affinity for carboxyl groups. The enzyme endopolygalacturonase, which hydrolyzes the internal 1,4- $\alpha$ -D-galacturonide bonds in galacturonides, splitting them into fragments, was selected as the main object of the investigation. The unit of activity selected was a quantity of the enzyme sufficient under defined conditions at 30°C in one minute to catalyze the hydrolysis of one milligram of pectin, reducing the viscosity of the solution by 20 percent. Highly purified enzyme with specific activity 12,000-15,000 units per mg of protein was used on a substrate of water-soluble citrus pectin containing carboxyl groups. The heterogeneous-lattice carboxyl cationites KM-2p and SG-1m were used for selective and reversible bonding of EPG and other protein macromolecules from salt-containing model solutions. The reversibility of adsorption of yeast EPG from salt-containing solutions was found to be complete. In the presence of the substrate, the EPG enzyme was desorbed from the carboxyl cationite at pH=5.2. Figures 4; references 10: 5 Russian, 5 Western.  
[191-6508]

UDC 661.728.89

#### AMINOACID ADSORPTION WITH Ca-FORM OF CARBOXYL CONTAINING CELLULOSE FROM AQUEOUS ETHANOL SOLUTIONS

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHESKIKH NAVUK in Russian, No 5, Sep-Oct 85 (manuscript received 16 Jan 85) pp 31-35

KAPUTSKIY, F.N., YURKSHTOVICH, T.L., STAROBINETS, G.L., BELAYA, A.V., BORSHCHENSKAYA, T.I. and YANOVA, T.V., Belorussian State University imeni V.I. Lenin

[Abstract] The mechanism of aminoacid adsorption by anion exchange resins is a debatable issue. In order to elucidate the role of aminoacid's hydrocarbon radical, the adsorption of monoaminomonocarboxylic acids from their aqueous-ethanol solutions was studied in a wide range of the composition of external solution using the Ca-form of monocarboxycellulose (MCC). A conclusion was reached that a specific mechanism exists for stabilization of zwitter ion groups during their adsorption from mixed aqueous-organic media, probably analogous to the mechanisms of electrolyte stabilization during their adsorption from such media. Thanks to the microlayering of the mixed solution at the ion exchange phase, alcohol radicals interact with hydrophobic segments of MCC(Ca<sup>2+</sup>) matrix intensifying the donor-acceptor interaction between alcohol OH groups and zwitter ion charges. A different situation exists with the cation exchange resin KB-4P-2(K<sup>+</sup>) in which the anti-ion-anion bond is primarily ionic and where the adsorption of alcohol radicals by ion exchange matrix is weakened because of low concentration of alcohol in the anion exchange phase. Thus, it was shown why MCC is the most suitable adsorbent for the aminoacids. Figures 3; references 12: 9 Russian, 3 Western.  
[216-7813]

SEMI-GROUP DETERMINATION OF AROMATIC HYDROCARBONS IN WIDE GASOLINE FRACTIONS  
BY GL-CHROMATOGRAPHY

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHESKIKH NAVUK in Russian  
No 5, Sep-Oct 85 (manuscript received 12 Dec 83) pp 6-8

TROSTYANSKAYA, V.V. and KULIKOV, V.I., Institute of Physical Organic  
Chemistry, BSSR Academy of Sciences

[Abstract] The goal of this work was to develop a simple method for  
determination of aromatic hydrocarbons in wide gasoline fractions. The  
following stationary liquid phases were evaluated: 1,2,3,4,5,6-hexakis-  
( $\beta$ -cyanoethoxy)hexane: 10% (of the weight of solid carrier -- Celite-545,  
particle size: 0.2-0.3 mm, column length: 2 m); FS-16: 10%; FS-303:  
10%; and 1,2,3-tris-( $\beta$ -cyanoethoxy)-propane: 25%. The last stationary  
liquid phase showed the best results. The separation of individual  
fractions could be further improved by extending the length of the column.  
Figures 3; references: 11 (Russian).  
[216-7813]

UDC 577.15.02+541.182.43

INCLUSION OF PROTEINS (ENZYMES) IN COLLOID-SIZE POLYMER PARTICLES

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2, KHIMIYA in Russian  
Vol 26, No 5, Sep-Oct 85 (manuscript received 16 Jul 84) pp 509-513

ABAKUMOVA, Ye.G., LEVASHOV, A.V. and MARTINEK, K., Department of Chemical  
Enzymology

[Abstract] The purpose of this work was to determine the possibility of producing protein (enzyme) preparations in a polymer shell by polymerization of monomers in the medium of the internal cavity of a protein-containing inverted micelle. The specific example used was a system of inverted OT aerosol (sodium diisooctyl sulfosuccinate) in toluene containing alpha-chymotrypsin acrylamide and methylene bisacrylamide. It was found that irradiation of solutions of monomers solubilized with AOT micelles in toluene resulted in disappearance from PMR spectra of the peaks of vinyl acrylamide protons. The major advantage of micellar polymerization is the production of particles of colloidal dimensions. Various monomers, including micelle-forming surfactants, can be used to create the polymer shell, so as to involve the entire micelle in the process of polymerization, obtaining an organic-soluble stable particle containing the biological catalysts. Figures 2; references 10: 6 Russian, 4 Western.  
[181-6508]

UDC 547.466.46

EFFECT OF ADMIXTURES IN AMINOACIDS ON THEIR THERMAL STABILITY

Minsk VESTSI AKADEMII NAVUK BSSR: SERIYA KHIMICHESKIKH NAVUK in Russian  
No 5, Sep-Oct 85 (manuscript received 20 Dec 84) pp 82-85

OSINOVSKIY, A.G., MOSKEVICH, Yu.R., ATRAKHIMOVICH, N.I., GALEYEVA, A.G.,  
YEROPEYEV, B.V. and RADKEVICH, S.Ye., Institute of Physical Organic  
Chemistry, BSSR Academy of Sciences

[Abstract] In an attempt to select optimal conditions for drying aminoacids, the effect of some admixtures was studied on the thermal stability of L-lysine (pharmaceutical purity and a crystalline, crude material).

Temperature and duration of drying was varied (120-220°C and 10-60 min, respectively). It was shown that pure L-lysine underwent no significant changes during short exposure to 160-180°C; crude material was less stable, and losses were noted as early as a 20-min exposure to 140°C. Detailed analysis showed that concentration of pure L-lysine decreased slowly with heating from 140 to 180°C and then more sharply in the temperature range 200-210°C; the drop in concentration of crude L-lysine was much more pronounced reaching 20% at 200°C. Figures 1; references: 2 (Russian) [216-7813]

## CATALYSIS

### CONTROLLABLE CATALYSTS

Moscow IZVESTIYA in Russian 11 Oct 85 p 6

[Article by I. Novodvorskiy under the "Discoveries of Our Days" rubric: "Controllable Catalysts"]

[Text] On 10 October 1985, the USSR State Committee for Inventions and Discoveries registered discoveries by scientists of the Institute of Chemical Physics, USSR Academy of Sciences: S. Roginskiy, corresponding member of the USSR Academy of Sciences, and doctors of chemical sciences L. Margolis, O. Krylovyy, and O. Godes.

Catalysts are one of the essential elements of chemical engineering and manufacturing, and it is difficult to overestimate their role in the chemical industry -- but not only the chemical industry. Various additives to catalysts can affect their properties. Chemists make these additives in two different forms, roughly speaking: intensifiers and reducers.

However, the authors of the discovery, based on many years' research, came to the conclusion that the additives are not so narrowly specialized: they can perform in different roles. One substance, depending on the concentration and temperature at which it is introduced, can both intensify and poison the catalyst.

This surprising fact alone, aside from the general theoretical values of chemical science, revealed the possibility to create principally new, highly effective catalysts.

Process engineers have fully taken advantage of such capabilities, and similar catalysts have found widespread use: from synthesis of acrylates to purification of waste gases from industrial production.

12304

CSO: 1841/62

## NEW DISCOVERY IN METALLIC CATALYSTS

Moscow RADIO in Russian 1900 GMT 26 Dec 85

[Text] A chemical discovery made by Moscow University scientists was registered, on 26 December 1985, at the USSR State Committee for Inventions and Discoveries.

Vladimir Mikhaylovich Gryaznov, one of those responsible for the discovery and a corresponding member of the USSR Academy of Sciences, discussed its impact:

"In order to speed up chemical reactions, industry makes extensive use of catalysts, including metallic catalysts. They are used from room temperature to red-hot incandescence. It is at such high temperatures that metal reaches a special state where its atoms move freely along its surface. The chemical processes take place among these moving atoms. On this basis it is possible 1) to predict the possibility for using the catalysts at a wider range of temperatures and 2) to activate the catalysts by heating them to high temperatures and then quickly cooling them to the temperature of the desired reaction. In this case, single atoms of the metal remain on the edge of the crystal, and the catalysts work better than when they are untempered. These results can be used in chemical industry, medical industry, and in obtaining photographic reagents, hence future developments in this work are expected."

/13046

CSO: 1841/234

UDC 547.315.2:547.314:542.941.7

HYDROGENATION OF CONJUGATED DIENES AND ACETYLENES INTO OLEFINS IN PRESENCE OF PALLADIUM COMPLEX CATALYSTS CONTAINING VARIOUS AMINES AS LIGANDS

Moscow NEFTEKHIMIYA in Russian Vol 25, No 5, Sep-Oct 85 (manuscript received 15 Oct 84) pp 589-593

PARENAGO, O.P., CHERKASHIN, G.M. and SHUYKINA, L.P., INKhS [Institute of Petrochemical Compound?] USSR Academy of Sciences

[Abstract] Selective hydrogenation in the presence of palladium complex catalysts is used to treat ethylene and propylene to remove traces of acetylenic hydrocarbons and to prepare other products. It has been shown that these catalysts may be prepared by reaction of palladium salts with tertiary aliphatic amines without using reducing agents. In the present work, various amines were reacted with palladium chloride for the purpose of obtaining active catalysts for the selective hydrogenation of dienes and acetylenes into olefins. Tributyl, trioctyl, trinonyl, dimethyldecyl and dimethyldodecyl amines, five derivatives of aminobenzene, pyridine and two of its derivatives were treated with  $\text{PdCl}_2$  in toluene or m-xylene under argon at 30°-80°C. Tertiary symmetric amines and N,N-dialkylaminobenzenes gave active reduced palladium complexes. Asymmetric tertiary aliphatic amines and aminobenzene or diphenylamine gave divalent palladium complexes capable of selective hydrogenation only after treatment with aluminum-organic compounds. References 5 (Russian).  
[198-12765]

UDC 547.316.6:542.941.7

HYDROGENATION OF LINEAR PIPERYLENE DIMERS OVER MODIFIED SKELETAL NICKEL

Moscow NEFTEKHIMIYA in Russian Vol 25, No 5, Sep-Oct 85 (manuscript received 14 Sep 84) pp 594-598

GVINTER, L.I., IGNATOV, V.M., YEGOROVA, V.Yu, KATS, G.A., BELOV, P.S. and FREYDLIN, L.Kh., Institute of Organic Chemistry imeni N.D. Zelinskiy, USSR Academy of Sciences; Moscow Institute of Petrochemical and Gas Industry imeni I.M. Gubkin

[Abstract] It was shown previously that linear piperylene dimers can be hydrogenated over homogeneous Pt-Sn catalysts to dienes at 80% yield. In the

present work, piperylene dimer hydrogenation over skeletal nickel was studied. The selectivity of this catalyst may be altered so that trienes are hydrogenated into dienes and olefins suitable for use as additives, detergents, surfactants, and other products. The linear piperylene dimers were hydrogenated in an autoclave in ethanol solvent containing pyridine, cadmium acetate, or lead acetate as modifiers to form products of varying degrees of saturation: 4-methylnonane, 4-methylnonene, 4-methylnonadiene-2,5 (-2,6, -2,7, and -5,7). Figures 2; references 8: 7 Russian, 1 Western.  
[198-12765]

UDC 665.652.72:66.094.173/546.73/661.183.6

HYDROCARBON SYNTHESIS FROM CO AND H<sub>2</sub> IN PRESENCE OF Co-CATALYSTS,  
CONTAINING HIGH SILICA ZEOLITES

Moscow NEFTEKHIMIYA in Russian Vol 25, No 5, Sep-Oct 85 (manuscript received 16 Aug 84) pp 640-644

LAPIDUS, A.L., KRYLOVA, A.Yu., VARIVONCHUK, N.E., KAPUSTIN, V.M. and KHOANG CHONG IEM, Institute of Organic Chemistry imeni N.I. Zelinskiy USSR Academy of Sciences

[Abstract] While much work has been done on high silica zeolites as catalysts for making motor fuels, these same catalysts may also be used as carriers for cobalt catalysts to synthesize similar hydrocarbon mixtures from carbon monoxide and hydrogen. In the present work, a study was made of some of the features of Fischer-Tropsch synthesis in the presence of Co-catalysts containing high silica zeolite pentasil and dealuminized mordenite. Catalysts were prepared by mixing cobalt carbonate with the carrier in 1:2 ratio (by weight) of Co:carrier. Pentasil carriers of 35, 39, 60, and 109:1 ratios of SiO<sub>2</sub>:Al<sub>2</sub>O<sub>3</sub> were used together with MgO as promoter. The aluminum content in the carrier is shown to have an effect on the yield and composition of hydrocarbons. Maximum selectivity and activity in liquid hydrocarbon synthesis was manifested in Co-catalysts containing 35 and 39 ratios and the dealuminized mordenite. Maximum hydrocarbon yield was attained at 180°-190°C, 1:2 CO:H<sub>2</sub> ratio and 90 hourly space (volume) velocity. Figures 3; references 4 (Russian).  
[198-12765]

INFLUENCE OF ANTIMONY ON CATALYTIC PROPERTIES OF NICKEL IN  
DEHYDROGENATION OF HYDROCARBONS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2, KHIMIYA in Russian  
Vol 26, No 5, Sep-Oct 85 (manuscript received 20 Jul 84) pp 505-509

LYSENKO, S.V., ABAKUSHINA, N.N., DOLGIKH, V.A., IVANOVA, T.M., POLYAKOVA, Ye.I.  
and KARAKHANOV, E.A., Department of Petrochemistry and Organic Catalysts

[Abstract] A study is made of the catalytic properties of nickel-antimony alloys in the reaction of dehydrogenation in order to determine the mechanism of passivation of heavy metals with antimony compounds on cracking catalysts. The model catalysts used were basic forms existing in the nickel-antimony system at 500°C, the temperature at which catalytic cracking is performed industrially. The surface of the nickel-antimony catalysts was studied by X-ray-electron spectroscopy. It was found that after preliminary oxidation and reduction of the catalysts, the yield of naphthalene is greater for oxidized catalysts than for reduced catalysts, probably as a result of the increase in specific surface in the oxidized catalyst forms. Nickel on zeolite-containing catalysts in reduced form is less active in dehydrogenation than in oxidized form. References 12: 6 Russian, 6 Western.  
[181-6508]

UDC 541.127.542.98.546.654

## REDUCTION OF ACETALDEHYDE BY HYDROGEN SPILLOVER

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 38, No 8, Aug 85  
(manuscript received 4 Jan 85) pp 510-512

POLADYAN, Ye.A., GUKASYAN, P.S. and NALBANDYAN, A.B., Institute of Chemical  
Physics, Armenian SSR Academy of Sciences, Yerevan

[Abstract] A kinetic study was conducted on the reduction of acetaldehyde by hydrogen in a spillover system using  $ZrNiH_3$  catalyst on zeolite, to assess the effects of acetaldehyde concentration and temperature. Studies over a temperature range of 370-570°K showed that at the low end (375°K) the yield of ethanol was 80%, with 15% of the aldehyde remaining unreduced. At 500°K virtually all of the acetaldehyde was converted to methane and water. Intermediate products (methanol, formaldehyde) were not detected at the high temperatures, although in some experiments small concentrations of ethane were observed. Partial pressure evaluations at 410°K demonstrated that, at an acetaldehyde pressure of 3 torr, ethanol was formed in a yield of 30% and the rest of the conversion was represented by methane. At 25 torr, the yield of methane was ca. 2% and of ethanol ca. 95%. Thus, the extent of acetaldehyde reduction is a function of acetaldehyde concentration and the temperature. Figures 2; references 7: 5 Russian, 2 Western.  
[182-12172]

## LIQUID-PHASE OXIDATION OF POLYMETHYLPHENOLS BY HYDROGEN PEROXIDE CATALYZED BY ALKALI METAL POLYVANADIUMMOLYBDATES (WOLFRAMATES)

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85 (manuscript received 28 Jun 84) pp 1969-1975

KORENSKIY, V.I., SKOBELEVA, V.D., KHARCHUK, V.G., KALENKO, I.P., VOLKOV, V.L., ZAKHAROVA, G.S. and VINOGRADOVA, V.N., Institute of Chemistry, Urals Scientific Center, USSR Academy of Sciences, Sverdlovsk

[Abstract] Kinetic studies were conducted on the oxidation of 2,6-dimethylphenol, 2,3,6-trimethylphenol, and 2,3,5-trimethylphenol by 37% hydrogen peroxide in acetone at 20°C, catalyzed by alkali metal polyvanadiummolybdates. The lithium, sodium, and potassium catalysts were found to function as selective catalysts for the synthesis of methylquinones. Detailed analysis of lithium polyvanadiummolybdate catalysts demonstrated that the reaction of the catalysts with hydrogen peroxide resulted in the formation of a peroxide complex of pentavalent vanadium --  $\text{VO}(\text{O}_2)_2^+$  -- which was responsible for the oxidation of the methylphenols. Oxidation of the trimethylphenols led to the formation of di- and trimethylbenzoquinones with selectivity approaching 100%. Maximal conversion of 2,6-dimethylphenol did not exceed 43%. Kinetic analysis also demonstrated self-inhibition of trimethylphenol oxidation, particularly at low (0°C) temperatures, which was attributed to the binding of vanadium by the resultant quinones. At room temperature, however, the quinone-vanadium complex was too unstable to play a significant role. Figures 2; references 8: 4 Russian, 4 Western. [179-12172]

UDC 547.245

## REGIOSELECTIVE HYDROSILYLATION WITH IONICALLY BOUND GROUP VIII METALS TO ION EXCHANGERS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85 (manuscript received 22 Mar 85) pp 2079-2084

NIKITIN, A.V. and REYKHSFELD, V.O., Leningrad Institute of Technology imeni Lensovet

[Abstract] Heterogenous catalysts were constructed for the hydrosilylation of styrene by methylchlorosilane at 333°K, with the catalysts consisting of group VIII metals affixed to basic (AV-17-8) and acid (Ku-2-8) ion-exchangers. Complexes formed with Ni, Co, Rh, Ir, and Pt functioned as stable catalysts, while Ru, Os, and Pd complexes were found to be labile in ion exchange under conditions of hydrosilylation. The heterogenous catalysts were found to be much more regioselective than the homogenous catalysts, yielding

the  $\beta$ -isomer in a 98.6% yield. The increase in catalytic activity and the increased regioselective product yield from 6 to 100% correlated with the  $3d < 4d < 5d$  sequence of the group VIII metals. Figures 1; references 16: 1 Polish, 13 Russian, 2 Western.  
[179-12172]

UDC 541.183

RELATIONSHIP BETWEEN CATALYTIC ACTIVITY AND HYDROGEN ADSORPTIVITY OF  
Pd-Co/Al<sub>2</sub>O<sub>3</sub> AND Pt-Co/Al<sub>2</sub>O<sub>3</sub> IN CYCLOHEXANE DEHYDROGENATION

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 10, Oct 85  
pp 20-21

BABEKOVA, L.V., BLAGOVESHCHENSKAYA, I.N., POPOVA, N.M., NADIROV, N.K.,  
LYKOVA, L.F. and KONDRATKOVA, N.I., Institute of Organic Catalysis and  
Electrochemistry, Kazakh SSR Academy of Sciences

[Abstract] A study was conducted on the correlation between hydrogen adsorptivity to Pd-Co/Al<sub>2</sub>O<sub>3</sub> and Pt-Co/Al<sub>2</sub>O<sub>3</sub> and their efficiency in catalyzing dehydrogenation of cyclohexane to benzene. Dehydrogenation was monitored at 300-480°C under atmospheric pressure, with the catalysts pretreated with hydrogen at 520°C for 15 min. Maximal catalytic activity was demonstrated by Pd and Pt catalysts at 480°C in which weakly-binding sites for hydrogen predominated, i.e., with hydrogen desorption energies of activation of ca. 126 kJ/mole. Such catalysts contained either 0.1% Pd or 0.05% Pt and 1.66% Co. Increasing the content of Pt or Pd to 3-4% resulted in firmer binding of hydrogen, with energies of activation for desorption on the order of 251-419 kJ/mole, and reduction in catalytic efficiency. Figures 2; references 7: 4 Russian, 3 Western.  
[188-12172]

UDC 541.128.13

PREDICTED SYNTHESIS OF SOLID CATALYSTS BASED ON THEORY OF CATALYSIS OF  
POLYHEDRONS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 9, Sep 85  
(manuscript received 14 May 84) pp 1987-1997

KOLESNIKOV, I.M., Moscow Institute of the Petrochemical and Gas Industry  
imeni I.M. Gubkin

[Abstract] Solid crystalline and amorphous catalysts are constructed of a combination of polyhedrons. In amorphous solid catalysts, the polyhedrons are oriented chaotically and can only be isolated in combinations which include two, three, or more polyhedrons. In this article, based on the

theory of catalysis by polyhedrons, thermodynamic methods are presented for selecting catalytically-active solid structures. Methods of determining the optimal composition are presented for two-component oxide-type catalysts. The theory of catalysis by polyhedrons is used to determine methods of testing the composition of solid catalysts. Conditions are noted which assure the preparation of active catalysts of the required composition and structure. Methods are developed for modification of the surfaces of solid catalysts in order to increase their activity and selectivity and select an active catalyst filler. Figures 4; references 27: 21 Russian, 6 Western.  
[191-6508]

UDC 547.722'733:542.97'944

#### HYDRODEHALOGENATION OF BROMO- AND CHLOROPYRIDINES ON COMPOUND AND METALLIC PALLADIUM CATALYSTS

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 9, Sep 85  
(manuscript received 31 Jul 84) pp 1229-1232

GUROVETS, A.S., SHARF, V.Z. and BELENKIY, L.I., Institute of Organic Chemistry imeni N.D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] The hydrodehalogenation of halogenpyridines in the presence of applied compound of palladium and of metallic palladium catalysts was studied. The catalytic hydrodehalogenation of the halogenpyridines had these distinguishing characteristics: 1) In the presence of metallic Pd, the process occurred more rapidly than on compound Pd, and 2) the dehalogenation of 3-bromopyridine occurs 3 to 4.5 times faster than the dehalogenation of 2-bromopyridine. The higher hydrodehalogenation rate of bromopyridines in comparison with the derivatives of furan, thiophene, and benzene might possibly be associated with the presence of a highly basic center in the pyridines. Analysis of the reaction products and the starting compounds was done using an LKhM-8MD chromatograph with a flame-ionization sensor. The temperature range was 70 to 120 degrees (automatic heating at 8 degrees per minute). The compound palladium was immobilized in silica gel. The catalytic hydrodehalogenation at 20 degrees and at atmospheric pressure. Figures 1; references 5 (Russian)  
[160-13050]

CHEMICAL INDUSTRY

POLITBURO OF THE CPSU CENTRAL COMMITTEE: PLANNING CHEMICAL PROGRAM

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Oct 85 p 1

[Unattributed report: "In the Politburo of the CPSU Central Committee"]

[Text] The Politburo of the CPSU Central Committee, in regular session, approved the Appeals of the CPSU Central Committee to the 68th Anniversary of the Great October Socialist Revolution. The text of the appeals will be published in the press.

The Politburo examined the comprehensive program of chemization of the USSR national economy for the period to the year 2000. This program envisions a significant increase in the output of fertilizers and means of plant protection, promising plastics, chemical fibers, and a number of other important chemical materials. The increase in the rate of growth of the chemical industry will promote an increase in the growth of machine building, agriculture, production of pharmaceuticals, industrialization of construction, and the development of transportation, as well as broadening the variety, increasing the quality, and improving the usefulness of consumer goods.

The program is directed toward further improvement of the industrial and scientific potential that has been created, and specifies important measures for the development and creation of highly efficient production processes, renovation and technical re-equipment of functioning enterprises, introduction of additional capacities for the output of chemical products and materials, automation and mechanization of production, decreasing the proportion of manual labor, and increasing the quality and broadening the variety of products produced. Considerable resources are earmarked for residential construction and the building of domestic and cultural facilities for workers of the chemical industry. The Party committees suggested to systematically monitor the fulfillment of the tasks specified by the comprehensive chemization program.

A decree was adopted by the CPSU Central Committee and the USSR Council of Ministers on measures for the anticipated growth of the raw material base and an increase in the technical level of nonferrous metallurgy from 1986 to 1990. The intensification of the work of associations and enterprises of the Ministry of Nonferrous Metallurgy and the machine building and construction ministries, specified by the decree, must provide a significant increase in the next five-year plan in placing additional capacities into service in ore

mining; expanding the use of promising technological processes, plants, and equipment; improving the complete use of extracted raw materials, as well as the development of new, large-scale deposits of nonferrous metals. Great attention will be paid to increasing the quality of production and improving the technical and economic indicators of associations and enterprises. All of this will make it possible to more fully satisfy the national economy's requirements for nonferrous metals. The central committees of the communist parties of the union republics have charged the party kraykoms and obkoms to improve the leadership of party organizations of nonferrous metallurgy enterprises, to intensify mass-political work in workers collectives, and to raise the efficiency of socialist competition to implement the measures mentioned above.

The Politburo agreed with the supplemental enactments, developed by the government, to provide workers of enterprises, institutions, and organizations located in areas of the Far North--and comparable localities--with residences in other parts of the country. In conjunction with this, privileges have been accorded for the appropriate categories of workers, and assignments have been made to increase the construction of residences and expand the participation of ministries and departments in such construction.

The Politburo examined the results of the visit to France of General Secretary of the CPSU Central Committee M.S. Gorbachev. It was emphasized that his visit with the president of France, F. Mitterand, and with other political and public figures of that country, and the understandings reached during the talks, laid a good foundation for the further development of friendly relations between the Soviet Union and France. The utmost importance of the Soviet-French summit was noted for strengthening European security, broadening European-wide cooperation, and improving the international situation. The important proposals put forth by the Soviet Union for preventing the militarization of space, curbing the race of nuclear and other arms, and developing fruitful international cooperation in Europe and in the world as a whole, conclusively demonstrated the peaceful foreign policy of our state. It was noted with great satisfaction that the initiatives of the Soviet Union, which were met with approval by the general public and the political circles and the leadership of many countries, are regarded as actions opening the possibility to turn toward the complete normalization of international relations and the strengthening of security for all countries and peoples.

The report by A.A. Gromyko on the meeting with the president of the Democratic Republic of Madagascar, D. Ratsiraka, and the information from comrade E.A. Shevernadze on the work of the USSR delegation at the 40th session of the General Assembly of the United Nations, and on his meetings in the USA with the President of the USA and other foreign political figures, were read and approved.

Resolutions on several other questions of internal and external politics were adopted at the session of the Politburo of the CPSU Central Committee.

12304  
CSO: 1841/62

## SHORTAGES IN FERTILIZER PRODUCTION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 25 Sep 1985 p 1

[Letter under the rubric "'Socialist Industry' Mail" from L. Lychenko, senior engineer, technical department, Order of the Red Banner Production Association "Azot", Nevinnomysk, titled "Thresholds on the Path of Renovation"]

[Text] Our collective now keenly feels the loss of the position which the "Azot" Production Association held for a long time among the leading enterprises in the field. All of the capacities created at our plant for more than 20 years, as a rule, were introduced and implemented ahead of schedule. The last of them, introduced last year, was a multi-ton plant for the manufacture of carbamide.

But, there has been breakdown after breakdown. Last year, for example, in the old carbamide factory only 200,000 tons of this valuable mineral fertilizer were obtained. In recent years, the volume of production even in other shops has declined. The causes of this unhappy situation are many -- and intrinsic, and not enterprise-dependent. But, the main reason has come to the forefront with absolute clarity: operation in the maximum modes-- which are justified and fully warranted--can not continue forever; the equipment has worn out and become obsolete. The factory is faced with system-wide re-equipment.

However, regardless of the obviousness, and regardless of the serious position we are now experiencing, our Soyuzazot organization, furthermore, is suggesting to carry out mainly only new construction here, ignoring the problems of reconstruction. The calculations of our specialists and their proposals for re-equipping the old factories have not been considered by either Soyuzazot or Minudobreniy [Ministry of Mineral Fertilizer Production]. Meanwhile, the need for the immediate allocation of resources specifically for technical re-equipment, with the simultaneous introduction of the newest achievements of science and technology, is frankly pointed out in many party documents.

In 1985, Soyuzazot allocated 17,000 rubles to us to pay for re-equipment design. Our general design agency, GosNII metanolproyekt, can only be doing us a favor for this sum. Frankly, this limited fund is miserably small.

By the way, even with such a small fund we see a way out of this position. But for this it is necessary to change the practice of interrelationships with the design institutes. They would perform work not only for the limited funds, but also under direct contracts. And the enterprise would pay them from their own funds. We would not ask the State for a single additional kopeck. It is also important that such requests, on the approval of the directors of institutes with which we work in close contact, can be filled without prejudice to the limited work. Once this is done, there is a strict limitation on funds, leading to a paradoxical situation: having the full ability to render us assistance, the very same GosNIImetanolproyekt will be forced to turn us down because of formal obstacles. This is precisely how the joint department of this institute acts, located across the street from us and created for the sake of Nėvinnomyskiy Azot.

As a result of the financing practice that has been developed, even the ready, complex developments of scientists that we need now are collecting dust on the shelf. We know that the Minudobreniy NPO [Scientific Production Association], for example, has developments concerning the improvement of important units in the phosphoric acid extraction shop. This is the same shop that, in our association, has not once met design capacity since start-up. We, ourselves, of course, are carrying out the work within our powers -- we are changing certain systems, but the basic solution to the problem is possible only as a result of the comprehensive reconstruction of this factory. And a number of others as well. The ministry does not acknowledge our attempts to improve things--to plug the holes--in the arrangements for new equipment, since the design capacity is not being achieved. That is why no compensation is due the participants in this work. But, in fact, in the near future we will have to switch the shop to processing apatite from a new deposit -- Kovdorskiy. The new raw material requires large-scale equipment reconstruction in the shop. But is this possible on worn-out equipment?

All of our attempts to turn the attention of the general designer and the VPO [All-Union Production Association] to the situation that has resulted, to provide stable operation at old capacities, have not been comprehended. Meanwhile, the beginning spell of failures may be wrapped up by a grave breakdown. Certainly, we do not intend to place all the blame on the shoulders of the higher organizations. Recently our collective experienced much and understood much. The harsh criticism, many times sounded at us, helped us to look at ourselves critically, fundamentally. Now, the leadership of the association and the party, professional trade union, and komsomol organizations are undertaking new efforts in the struggle against breakdowns in labor and production discipline that lead to down time, low quality of production, and even serious accidents. In turn, the specialists decided to carry out a thorough search of new reserves at each work place.

These reserves, indeed, are many. Nearly one-third of all the workers at our plant are engaged in manual labor, mainly in loading and unloading the product. In conjunction with this, we decided first to accelerate the work of our mechanization laboratory. Last year a number of important developments were introduced, including a mechanized bottling line for acetic acid for the food industry and coverings for drums with alkali, and made a machine

for unloading alumina. However, the pace of work of this small laboratory leaves much to be desired.

In short, Azot can and must get out of this debacle. This is now the main task of the collective, with its quite vigorous, experienced core of regular workers and specialists. The goal of these efforts, if there is one of course, will be supported by the correct strategy of the further development of production.

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CSO: 1841/62

STUDY OF KINETICS OF DESULFURATION OF HIGH-SULFUR CARBON

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 9, Sep 85  
(manuscript received 15 May 84) pp 2148-2150

KALANDADZE, N.D., Institute of Inorganic Chemistry and Electrochemistry,  
Georgian SSR Academy of Sciences

[Abstract] The purpose of this work was to study the major kinetic regularities of thermal oxidative desulfuration of carbon in order to determine the possibility of using low temperature heat treatment in an oxidizing medium to reduce the sulfur content of solid fuels. Studies were performed on brown coal containing sulfur as compounds in both the mineral and organic portions. The pyrite sulfur dominated over other forms. Experiments were performed under isothermal conditions in a stationary tubular furnace. The data indicated that sulfur begins to be liberated into the gas phase at 200-220°C, although up to 300°C the quantity of sulfur burned off is insignificant. Above this temperature, the desulfuration curve rises rapidly, indicating significant chemical transformation of sulfur compounds, reaching 70-75 percent desulfuration in 10 minutes at 380-400°C. The kinetic regularities of oxidative desulfuration are studied. In the 280-400°C temperature interval, the desulfuration rate constant varies from  $0.27 \cdot 10^{-4}$  to  $2.93 \cdot 10^{-4} \text{ s}^{-1}$ . The apparent activation energy of the process is 66,900 J/mol. Figures 4; references 10: 9 Russian, 1 Western.  
[191-6508]

ELECTRICAL AND PHOTOELECTRIC PROPERTIES OF LEAD PHTHALOCYANINE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 6, 1985  
(manuscript received 28 Dec 84) pp 1396-1399

VARTANYAN, A.T. (Presented by Academician N.S. YENIKOLOPOV)

[Abstract] Lead phthalocyanine (PbPc) is a potential organic semiconductor. A sample, prepared and purified at the Ivanov Chemical Engineering Institute, was deposited on a quartz base in a cross-sectioned cell between two platinum electrodes 0.5 mm apart. The PbPc layers, several nanometers thick, was studied under vacuum and in oxygen or ammonia. The electrical and photoelectrical properties were studied, and curves showing spectral distribution of photocurrent are presented. Contact with oxygen at room temperature results in both dark and light current, while ammonia suppresses dark current. Figures 2; references 14: 9 Russian, 5 Western.  
[183-12765]

## FERTILIZERS

### FERTILIZING FOR OPTIMUM CORN HARVESTS

Moscow SELSKOYE KHOZYAYSTVO ROSSII in Russian No 8, Aug 85 pp 20-21

[Article by M. Klevtsov, chairman of the "Krasnaya Niva" Kolkhoz in the Kabardino-Balkarsk ASSR: "One Hundred Centners of Corn per Hectare"]

[Excerpts] After planting, we roll the soil with segmented or water-filled rollers to "seal" the Eradicane applied earlier into the soil. We don't harrow the crops so that this volatile herbicide won't evaporate. If rain hinders rolling, we leave the field untouched until germination. Dicotyledonous weeds are destroyed with 2.4D herbicide (two kilograms per hectare) using an IFA automatic sprayer. Note that this herbicide is best sprayed without exceeding the recommended dosage, when 3-5 leaves have appeared.

Since our crops are mostly irrigated, Eradicane cleans them in the early stage of development and eliminates the need for an initial cultivation (as opposed to the usual process). Crops planted in soils with a heavier mechanical content and contaminated with Guinea grass roots received a second cultivation with bits and top dressing.

In all irrigated fields, we cut irrigation furrows and also top dress with nitrogen or nitrogen-phosphorus fertilizers at a rate of 1 centner per hectare. It is very important to finish cutting irrigation furrows when 8-9 leaves have appeared. This way, the plants are not damaged by the tractor.

The collective farm's agrochemical laboratory constantly monitors the moisture content of the soil in a one-meter layer. We begin to irrigate when moisture equals 70% of the field's total moisture capacity and keep it at 80%. In 1984, we irrigated twice along furrows at a rate of 1,200 cubic meters per hectare. Last year was wet, precipitation was 144 mm above the norm. Therefore, there was no third irrigation.

As many as 100 men are involved in irrigation, which allows us to finish it in 7-10 days.

One of the factors ensuring a good corn harvest in 1984 was the use of high doses of organic and mineral fertilizers. One hundred tons of manure were

applied to a 300-hectare area planted in corn. We didn't skimp on fertilizer, either. So, 173 kilograms of active nitrogen, 140 of phosphorus, and 100 of potassium fertilizers were applied to the corn crop.

Phosphorus and potassium fertilizers were applied during tilling and pre-planting cultivation, and nitrogen fertilizers during preharvest cultivation and by top dressing when Johnson grass was cut. During planting, a hectare received 50 kilograms of nitramine phosphates, which our fields need. Although their yield is high, NSSK-606 and ZPSK-704 hybrids impoverish the soil. Therefore, if fields are repeatedly planted in corn or even other crops, we must take care to apply higher doses of fertilizers (at least 10-15 centners per hectare), paying special attention to uniform application. RUM's [mineral fertilizer spreaders], by the way, are no good for this purpose.

In conclusion, a few words about agrotechnical measures to fight weeds -- especially Guinea grass -- under irrigation. Using Eradicane doesn't help: the herbicide is good at killing seed grasses, but has virtually no effect on Guinea grass, which grows from rhizomes. This is worth emphasizing, especially since Guinea grass is a weed which propagates in two ways: through seeds and vegetatively. But there is another method -- strict alternation of an entire plant (peas, winter wheat, hemp, alfalfa), rotated with corn. These crops do not decrease in yield, even in fields thick with Guinea grass. After them, you can plant corn 2 or 3 years in a row in the same field and get a harvest without expenditures for Eradicane application and manual labor. With corn crops, Eradicane can be used in following years. When you select the variety, you have to consider that medium-early and medium-late corn hybrids like Dneprovskiy 247, Luch-300, ZPTK-194, and others have a smaller leaf surface, grow shorter, and, shading the weeds, cannot struggle with them.

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12809/13046  
CSO: 1841/149

## LIMING SOILS AND FERTILIZING

Moscow SELSKOYE KHOZYAYSTVO ROSSII in Russian No 9, Sep 85 pp 35-37

[Article by M. Sirayev, Minister of Agriculture, Tatar ASSR]

[Text] Liming acidic soils with comparatively low outlays greatly increases the harvest of agricultural crops during crop rotation and is one of the basic conditions for efficient use of mineral fertilizers. This fact is confirmed by the quite substantial increase in the harvest on several Tatar farms.

For example, the Alga Kolkhoz in the Vysokogorskiy Rayon obtained 2.3 centners more oat hay and a centner more spring wheat by applying two tons of lime per hectare. Application of  $N_{60}P_{60}K_{60}$  to the soil increased the hay harvest by 15.2 centners. The spring wheat harvest also increased by almost 7 centners with doses of  $N_{60}P_{60}K_{60}$  fertilizer.

At the Izvestiya Kolkhoz in the Arskiy Rayon, 80% of the plowed fields had acid soil before liming, and the average annual grain harvest was no more than 18.3 centners per hectare; that of potatoes, 100 centners. After reduction, grain harvests in 4 years of the 11th Five-Year Plan grew an average of up to 23.4, and potato harvests by 156 centners, although use of fertilizers remained virtually the same as before liming.

As we know, calcium and magnesium are added to the soil along with lime. These elements not only nourish plants, but also help preserve soil fertility. Practice shows that in highly acidic soils, free phosphorus is converted into a form unassimilable by plants, and its water-physical properties drastically deteriorate.

The soil mantle of our autonomous republic is highly variegated. The soils of the Predkamyie area are basically soddy podzolic and young forest. Acidic soils in this zone amount to 778,000 hectares; of those, about 200,000 are highly and moderately acidic. In the Zakamyie area, highly leached black earths predominate. The total area of soils with high acidity there is 437,000 hectares. In Predvolzhye, the dominant soil mantle consists of leached and podzolized black earths and young forest soils.

Thus, a considerable area of the republic's farmlands represents acid soils. Therefore, a large part of the material and technical resources has been directed to chemical improvement. Since the agrochemical service was organized by Tatselkhozkhimii, the republic has started up 14 quarries, and production of lime materials has increased from 320,000 tons in 1979 to a million in 1984. Quarries for production of local lime materials are being constructed on a shoestring. The situation became acute, and still is, because Selkhozkhimii subdivisions are not supplying crushing equipment, building materials, or electrical equipment. Nonetheless, lime is being quarried, and not in small quantities.

Then, how is work to quarry it being accomplished?

Bulldozers remove upper layers, which are then used to recultivate worked-out areas. The lime layer is loaded by excavators and carried to processing points. Each point has feed hoppers, SM-741 or SM-16A primary crushers, GPL-42 and GIL-52 screeners, an SM-114 secondary hammer crusher, a B-650 or B-800 transporter, a KTP-4R0 transformer substation, and a control pulpit. The average capacity of a point is 25-30,000 tons of raw crushed lime per season. The operation is run with two 13-14-man shifts, including the quarry manager, shift foreman, two excavator operators, two bulldozer operators, two drivers, an on-duty mechanic-electrician, and four or five crusher operators. The net cost of output is no more than one ruble per ton.

For lime application, the Baltasinskiy, Zainskiy, Severo-Nurlatskiy, Laishevskiy, Rybno-Slobodskiy, and Novo-Sheshminskiy Rayon Associations of Selkhozkhimii have manufactured KST-5 spreaders, which are attached to the T-150K tractor. If these machines are equipped with low-pressure tires, they can be used in any weather and at any time of year. This spreader makes it possible to increase labor productivity 25-35% above that with the KSA-3 and RMG-4.

The Vysokogorskiy and Zainskiy Rayon Associations of Selkhozkhimii have mounted KSA-7 spreaders on URAL-5557 trucks. This machine's wide range of travel speeds and all-terrain capabilities make it possible to deliver and apply lime in any weather. The republic now has 30 of these spreaders operating.

As a result of these measures, the scope of chemical improvement work has grown sharply. In 1978, lime was applied to an area of 80,000 hectares, but in 1984, to 200,000 hectares. Our fields received a total of 1.5 million tons of lime materials last year. Organic fertilizers amounting to 18,319,000 tons were delivered.

As a result of this work, the area of acid soils was diminished, and the content of free phosphorus increased: in the Predkamye rayons, for example, from 7 milligrams per 100 grams of soil to 9. Therefore, the yield of grains there increased 20.3% in the 11th Five-Year Plan, and that of root and root crops by 64.7%. More annual and perennial grasses were harvested, more corn was siloed, and more other crops were gathered.

Changes are more evident in those regions where, along with liming, a necessary concern was increasing organic substances in the soil. On farms in the Baltasinskiy Rayon, for example, which have acidic soddy podzolic soils poor in humus, 10 tons of compost are applied yearly to a hectare of farmland. Systematic application of lime and organics has made it possible to quickly reduce the area of acid soils by 40% and to increase the yield of all crops. Thus, while no more than 12 centners of grain were collected in the rayon, the average annual yield in the 4 years of the 11th Five-Year Plan was 17.4 centners. The yield of root crops grew by 44% and now averages 735 centners per hectare for the region. The per-hectare yield of potatoes has also risen noticeably.

In the Kukmorskiy Rayon, reduced soil acidity made it possible to raise the grain yield by 40% in the present five-year plan, that of fodder root crops by 122%, and that of potatoes by 18%.

Similar figures can be applied to the Arskiy, Vysokogorskiy, and Pestrachinskiy Rayons, where liming is always the focus of the RAPO [expansion unknown].

However, although the agrochemical indices of Predkamye soils are improving, areas of acidic soil have increased by 240,000 hectares in the collective and state farms of Zakamye, since liming there is done haphazardly. Therefore, the rates at which the area's yield has increased are low: the grain harvest in the 11th Five-Year Plan rose by only 0.3 centners per hectare.

Calculation of the calcium balance over the past 50 years by the Kazan Branch of the VNIPTIKHIM [expansion unknown] has determined the essence of this phenomenon. The fact is that calcium depletion due to more intensive farming has increased sharply. Today, it is being removed from the soil (in the form of  $\text{CaCO}_3$ ) at the rate of 203 kilograms per hectare. This is 10 times faster than in 1928, when privately-owned peasant farms did not use fertilizers, and the crop structure did not include sugar beets, fodder root crops, corn, or perennial grasses -- crops which remove calcium five to six times faster than grains.

The focus of attention for neutralizing acidic soils is now shifting to the republic's Zakamskiye regions with no detriment to liming in other zones. In the future, 150-160,000 hectares there are scheduled to be limed annually. This task is very complicated, but we are determined to solve it. Efforts are now being made to reconstruct the Utyakovskiy Quarry, and it soon will produce 250-300,000 tons of lime per year. New quarries are being built in Sarmanovskiy, Muslyumovskiy, and other regions. The work rate accelerates yearly.

Today, we practice maintenance liming of weakly acidic soils. We calculate the proportion of lime in terms of the part of the carbonate balance consumed. Depending on the mechanical composition of soils, it is 1.8-2.5 tons of  $\text{CaCO}_3$  per hectare. This is enough to maintain acidity at the optimum level for 5 years.

By the end of 1985, the republic will have started construction of seven lime quarries. But it is sometimes impossible to obtain crushing equipment and spare parts for it.

Many of Selkhozkhimii's rayon associations do not even have high-powered loaders. Therefore, K-701 tractors with home-made ones must be used. In comparison with the series-built PFP-1.2 and the PB-3.5, this loader increases labor productivity by 50-60%. Each transports 1,000 tons of lime materials per shift. It does not require special handling equipment and is distinguished by high maneuverability. The net cost of loading a ton of lime drops 25%. Selkhozkhimii's subdivisions now have 23 of these machines.

Work in quarries is set up on a brigade basis. This type of labor organization is also used to apply lime. Last year at the Alekseyevskiy Rayon Association of Selkhozkhimii, a unit of three men headed by M. Minullin limed an area of 4,33 hectares. Labor productivity in the collective rose 18%; wages, 11%. In the first quarter of this year, the unit fulfilled 120% of its goal.

Now, a word about integrated agrochemical cultivation of fields (KAKhOP). As a rule, the most neglected fields undergo KAKhOP. Agrochemists restore them to order and turn them over to the owner with a guarantee.

At first KAKhOP was introduced in small areas. Once its effectiveness was certain, large-scale implementation was undertaken. What agrochemical cultivation does for fields can be demonstrated by the example of the Iskra Kolkhoz in the Zelenodolskiy Rayon, where 84 out of 122 hectares of fallow land were treated under the KAKhOP program. Sixty-five tons of organic fertilizer, 5 tons of lime, 1.6 tons of phosphate meal, and 90 kilograms of dewatered urea were applied per hectare there. In addition, herbicides were used in chemical weeding. As a result, winter rye yielded 47 centners, as opposed to 31 from fallow land which had not been worked with this integrated approach.

In 1983, agrochemical field cultivation was carried out on 69,000 hectares; for the 1985 harvest, on more than 100,000. Overall, these fields last year produced an additional 400,000 centners of grain (the per-hectare increase was 5.3 centners). And in the Tukayevskiy, Alekseyevskiy, Apastovskiy, Nurlat-Oktyabrskiy, and Vysokogorskiy Rayons, each hectare of soil cultivated in this way yielded an additional 9-16 centners of grain.

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UDC 661.635.42

INFLUENCE OF pH ON PROCESS OF PRODUCTION OF DIMAGNESIUM PHOSPHATE TRIHYDRATE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 9, Sep 85  
(manuscript received 8 June 84) pp 2102-2103

GRABOVENKO, V.A., VYAZOVOV, V.V., BISHKO, Ya.V., GREBENYUK, D.V. and  
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Planning Institute of Halurgy

[Abstract] This work, which studies the influence of pH on precipitation of dimagnesium phosphate trihydrate, is dedicated to the development of a technological process for treatment of polymineral potash and silvin-carnallite ores. Magnesium was precipitated at 40°C by feeding an equimolar quantity of sodium phosphate solution obtained by neutralization of phosphoric acid with calcined soda into a solution of magnesium chloride containing the basic substance at 25 percent. After 10 minutes mixing of the suspension formed, a portion of the sample was filtered and analyzed. The remaining suspension was neutralized with NaOH (40%) to pH 6.5-7.0, filtered and analyzed. It was found that in order to precipitate magnesium as dimagnesium phosphate trihydrate with good filtration properties and improved chemical composition, the process should be performed initially at pH 5.3-5.7, then the suspension should be neutralized with sodium hydroxide to pH 6.5-6.8. Figures 1; references: 5 (Russian).  
[191-6508]

UDC 631.83

EFFECT OF UREA-FORMALDEHYDE RESINS ON SOLUTION RATE OF GRANULATED POTASSIUM FERTILIZERS

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHESKIKH NAVUK in Russian  
No 5, Sep-Oct 85 (manuscript received 7 Dec 83) pp 88-93

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Organic Chemistry, BSSR Academy of Sciences

[Abstract] One of the ways of increasing effective utilization of fertilizers by plants is to develop slowly-acting reagents such as urea-formaldehyde (UF) fertilizers. The latter, however, are expensive and in short supply.

To resolve this, UF resins are used in small quantities as binders or covers for the rapidly dissolving mineral fertilizers. The kinetics of solution process of various potassium fertilizers was studied in an attempt to explain the mechanism of action and to evaluate the effectiveness of film-forming reagents used in preparation of slowly-acting potassium fertilizers. These test samples were granulated with admixtures of UF resins and various hydrolyzable metal salts. It was shown that at elevated temperatures these film-forming reagents form inside the granules and, on their surfaces, spacial polymer networks so that KCl particles are glued together and even become incorporated into this network. Their solution rate in water is limited by swelling and by the solution of the polymer films, and KCl diffusion through them; hence, they are released slowly. In addition, the granules store well and can be shipped easily. Figures 2; references: 7 (Russian).  
[216-7813]

STABILITY OF FOOD EMULSIONS. STABILIZATION WITH CASEIN

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2, KHIMIYA in Russian  
Vol 26, No 5, Sep-Oct 85 (manuscript received 23 May 84) pp 480-482

MALKOVA, D.A., IZMAYLOVA, V.N. and YAMPOLSKAYA, G.P., Department of  
Colloid Chemistry

[Abstract] The purpose of this work was to improve a simple method for determining the coalescence of emulsions based on the rate of layer separation in oil, to study the influence of emulsion concentration and of stabilizer on coalescence of oil/water emulsions, and to study the influence of various additives, the pH of the aqueous phase and temperature. Casein was used as the stabilizer because it forms interphase layers which have a structural-mechanical Rebinder barrier preventing emulsion breakdown. The simple method of observing the initial rate of separation of the oil phase was found to yield a quantitative estimate of the stability of emulsions. The addition of alcohol or lecithin or an increase in temperature were found to be effective in breaking down food emulsions. The mechanism of coalescence will be discussed in subsequent works. References 16: 10 Russian, 6 Western.  
[181-6508]

UDC 547.581.543.544:637

DETERMINATION OF BENZOIC ACID IN MILK BY GAS LIQUID CHROMATOGRAPHY

Minsk VESTSI AKADEMII NAVUK BSSR: SERIYA KHIMICHESKIKH NAVUK in Russian  
No 5, Sep-Oct 85 (manuscript received 15 Dec 83) pp 110-112

GLUKHOVSKAYA, M.I., BALKOV, B.G., MIKHALENYA, R.V. and DALIDOVICH, L.V.,  
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[Abstract] Benzoic acid and its sodium salt are used as preservatives of fodder. To evaluate whether such reagents are accumulated in milk or removed from the body, a gas-liquid chromatographic method was developed for determining benzoic acid in cows milk. The method involved hydrolysis of

benzoic compounds and extraction with ethyl ether followed by chromatography. The results showed that the presence of benzoate preservative in fodder does not lead to greater concentrations of benzoic acid in milk than its absence from fodder. References 7: 3 Russian, 4 Western.

[216-7813]

## CORROSION RESISTANCE OF SINTERED AND PYROLYTIC BORON NITRIDE IN SALT MELTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 9, Sep 85  
(manuscript received 7 Jun 84) pp 2016-2020

KUZNETSOV, S.A., POLYAKOV, Ye.G. and STANGRIT, P.T., Institute of Chemistry and Technology of Rare Elements and Mineral Raw Materials, Kola Affiliate, USSR Academy of Sciences

[Abstract] The purpose of this work was a comparative study of specimens of sintered and pyrolytic boron nitride in a number of salt melts, including KCl-NaCl-K<sub>3</sub>AlF<sub>6</sub> (15 mass%) (1), LiF-BaF<sub>2</sub>-LaF<sub>3</sub> (40 mass%)-La<sub>2</sub>O<sub>3</sub> (2 mass%) (2), KCl-NaCl-K<sub>2</sub>HfF<sub>6</sub> (15 mass%) (3), KCl-NaCl-K<sub>2</sub>ZrF<sub>6</sub> (15 mass%) (4), KCl-NaCl-K<sub>2</sub>NbF<sub>7</sub> (10 mass%) (5), and KCl-NaCl-K<sub>2</sub>TaF<sub>7</sub> (10 mass%) (6). The apparatus and method of measuring volt-ampere curves were described in a previous work. The specimens of pyrolytic boron nitride were quite stable in oxyfluoride melts containing rare-earth elements and in chloride-fluoride melts containing K<sub>3</sub>AlF<sub>6</sub>, K<sub>2</sub>HfF<sub>6</sub>, and K<sub>2</sub>ZrF<sub>6</sub>. In contrast to sintered boron nitride, pyrolytic boron nitride is not saturated by salt melts, which makes it possible to use it for the physical and chemical study of the melts. The absence of adhesion of pyrolytic boron nitride to vitreous carbon and pyrolytic graphite allows various products to be made of it, particularly capillaries, allowing the creation of cells with large constants for the measurement of conductivity of very corrosive melts. Pyrolytic boron nitride is not usable for electric insulation in melts containing K<sub>2</sub>NbF<sub>7</sub> and K<sub>2</sub>TaF<sub>7</sub> due to the formation of conducting metal nitrides on its surface. Figures 3; references: 10 Russian, 7 Western. [191-6508]

## NITROGEN COMPOUNDS

UDC 622.331:631.417.2

### CHARACTERISTICS OF WATER SOLUBLE AMMONIZED PEAT COMPOUNDS

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHESKIKH NAVUK in Russian  
No 5, Sep-Oct 85 (manuscript received 28 Nov 83) pp 102-105

MAL, S.S., POVARKOVA, S.S. and SLIVKA, Z.M., Peat Institute, BSSR Academy  
of Sciences

[Abstract] The composition and properties of water soluble compounds present in peat treated with ammonia were studied; this type of peat is used as a fertilizer. Fractionation of these compounds was done by a stepwise precipitation in acid medium at different pH values (5, 4.5, and 2), followed by centrifugation, washing, and drying. Elemental analysis was then carried out on individual fractions. It was shown that nitrogen fixation in humic acid nuclei was in the form of heterocycles and, in the side chains, in the form of amide groups; this imparted amphoteric properties on them and was probably responsible for precipitation of humic acids already at pH 4.5-5. Figures 2; references: 7 (Russian).  
[216-7813]

UDC 546.11:546.21:541.183:541.128

### FORMATION OF ISOTHERMALLY DESORBED AND THERMALLY DESORBED NITROGEN AND AMMONIA ON IRON CATALYST FOR AMMONIA SYNTHESIS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 9, Sep 85  
(manuscript received 6 Apr 84) pp 2121-2124

YEVDOKIMOVA, Zh.A. and VALITOV, N.Kh.

[Abstract] The authors previously established that upon adsorption of gases on catalysts, isothermally desorbed and thermally desorbed forms of molecules are formed. The present work presents results from studies of molecules of adsorbed nitrogen and ammonia of various forms on commercial catalysts used for the synthesis of ammonia. Adsorption and desorption studies were performed on a chromatographic installation consisting of a system for purifying the carrier gas, the adsorption-desorption system, and a system for chromatographic analysis of the gas phase. the carrier gas

used was helium. The nitrogen and ammonia were found to be adsorbed on the iron catalyst, forming molecules of one isothermally desorbed and several thermally desorbed forms. As the adsorption temperature increased, desorption of nitrogen molecules of all four thermally desorbed forms increased. As adsorption temperature increased, the degree of coverage of the surface decreased. The quantity of crystal defects of type I on which molecules of nitrogen of form I were adsorbed was greatest, while that of form IV was least. The activation energy of desorption of molecules of nitrogen of the first thermally desorbed form was least, that of the fourth form was greatest. The formation of isothermally desorbed nitrogen molecules is explained as follows. The significant activation energy of desorption of thermally desorbed forms of nitrogen molecules indicates that these molecules are held by atomic defects in the catalyst crystals on firm covalent bonds. Isothermally desorbed nitrogen molecules developed as a result of formation of molecular ions due to the transition of an electron from the adsorption center to the antibonding orbital of the nitrogen molecule. Figures 3; references: 8 (Russian).  
[191-6508]

ORGANOMETALLIC COMPOUNDS

UDC 543.544:547.979.733:665.61

HIGH EFFICIENCY LIQUID CHROMATOGRAPHY OF PETROLEUM VANADYLPORPHYRINS

Moscow NEFTEKHIMIYA in Russian Vol 25, No 5, Sep-Oct 85 (manuscript received 17 Dec 84) pp 692-698

MOZZHELINA, T.K., SEREBRENNIKOVA, O.V., BEYKO, O.A. and KRASOVSKAYA, L.I.,  
Institute of Chemistry of Petroleum, Siberian Department, USSR Academy of  
Sciences, Tomsk

[Abstract] High efficiency liquid chromatography was used to separate and identify vanadylporphyrins from four Western Siberia and Sakhalin crudes differing in age, depth of location, and porphyrin content. Porphyrin content was determined on a Specord UV-Vis spectrophotometer by intensity of the 570 nm absorption line. Separation of sample components was carried out on an L-4000W liquid chromatograph "Yanako" (Japanese made) employing a 250X4 mm column filled with ODS-T adsorbent (5 mc particle size) and 5% chloroform in methanol as eluent at 1.0 ml/min space velocity at 20°C and 0.9 MPa. Detection was done on an M-315 spectrophotometer (also Japanese made). Thin layer chromatography was carried out on a Silufol plate and mass spectra were recorded on an MAT-311 "Varian" mass spectrograph. Residence times of the petroleum porphyrins and vanadylporphyrins were determined by the number of carbon atoms in the side chains of the porphyrin rings. Figures 3; references: 2 (Russian).  
[198-12765]

UDC 547.1.13:542.91:591:49

SYNTHESIS AND PROPERTIES OF BENZENECHROMOTRICARBONYL DERIVATIVES OF  
DIVALENT LANTHANOIDS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 6, 1985 (manuscript received 25 Dec 84) pp 1376-1378

SULEYMANOV, G.Z., KHANDOZHKO, R.N., MEKHDIYEV, R.Yu, PETROVSKIY, P.V.,  
AGDAMSKIY, T.A., KOLOBOVA, N.Ye., and Corresponding Member USSR Academy of  
Sciences BELETSKAYA, I.P., Scientific Research Physical Chemical Institute  
imeni L.Ya. Karpov, Moscow

[Abstract] Organic derivatives of divalent lanthanoids  $R_2Ln$  have been limited to compounds where R is a strong electron acceptor. Such compounds

are of interest in electronics and as possible olefin isomerization catalysts, as well as in the further development of theoretical problems in the organic chemistry of lanthanoids. It was previously demonstrated that  $\text{Ph}_2\text{Hg}$  reacts with Yb in boiling tetrahydrofuran to give  $\text{Ph}_2\text{Yb}$  at about 1% yield. When this reaction was run with amalgamated ytterbium for several days, extremely unstable  $\text{Ph}_2\text{Yb}$  was obtained at 30% yield. The introduction of a chromotricarbonyl group into the benzene ring makes it possible to prepare corresponding bis-benzenochromotricarbonyl derivatives of bivalent lanthanoids. Such compounds, where Ln is Sm, Eu, and Yb, were prepared at 62-73% yield. They are readily soluble in polar solvents, moderately so in aromatic and poorly soluble in aliphatic hydrocarbons. The complexes oxidize instantly in air. References 13: 4 Russian, 9 Western.  
[183-12765]

UDC 547.1'13+546.72

INTERACTION OF FERROCENYL COPPER WITH BENZOYL CHLORIDE IN PRESENCE OF NUCLEOPHILS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2, KHIMIYA in Russian  
Vol 26, No 5, Sep-Oct 85 (manuscript received 23 May 84) pp 494-497

MOISEYEV, S.K., MELESHONKOVA, N.N. and SAZONOVA, V.A., (deceased),  
Department of Organic Chemistry

[Abstract] A study is reported of the influence of various additives on the yield of alkylphenols in the reaction of organic copper compounds with acyl chlorides using as an example the interaction of ferrocenyl copper with benzoyl chloride. In the ferrocene series, the influence of additives on the yield of acyl derivatives in reactions of organic copper compounds with acyl chlorides is opposite to their effect in alkyl and acetylene series. This is apparently related to the influence of the ferrocenyl group on the structure and properties of the intermediate complex formed in the reactions. References 8: 1 Russian, 7 Western.  
[181-6508]

## SYNTHESIS AND PROPERTIES OF PHOSPHORUS-CONTAINING METAL ACETYLACETONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85  
(manuscript received 4 Jul 84) pp 2042-2050

SHAPKIN, N.P., REUTOV, V.A., SVISTUNOV, G.M. and GLUSHCHENKO, V.Yu.,  
Far Eastern State University, Vladivostok

[Abstract] Trivalent phosphorus compounds were employed as nucleophilic reagents for reaction with  $\gamma$ -halogenated metal acetylacetonates for the synthesis of phosphorus-containing polychelates. The latter compounds contained phosphorus-oxygen bridges between the metal atoms. In addition, the method also led to the formation of ligands with a phosphorus-carbon atom bond on the  $\gamma$ -position of the chelate ring. With an increase in the nucleophilicity of the phosphorus in going from intermediate phosphites to sodium dialkylphosphites, the degree of ligand and halogen substitution increased 1.5- to 2-fold. The reactivity of the individual  $\gamma$ -halogenated acetylacetonates in substitution reactions with P(III) derivatives ranked as follows: Ni > Eu > Cr > Al. Figures 1; references 10: 8 Russian, 2 Western.  
[179-12172]

UDC 547.13+547.235+547.425

## FERROCENYLKETIMINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85  
(manuscript received 13 Feb 85) pp 2093-2097

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[Abstract] Products of the reactions of organic acid nitriles or cyanogen chloride with organometallic compounds were monitored for the stability of the intermediate products -- ferrocenylketimines -- in the synthesis of ferrocenylketones. In the case of reactions involving nitriles and organolithium compounds, the ferrocenylketimines were stable both in the free state and as the hydrochloride forms. The free forms were dark-red or light-brown in color, while the hydrochlorides were dark-violet crystals. Phenylferrocenylketimine, however, was unstable. References 11: 3 Russian, 8 Western.  
[179-12172]

INTERACTION OF HALOGENATED ACETYLENEPHOSPHONATES WITH ANIONIC NUCLEOPHILIC REAGENTS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85  
(manuscript received 16 Jul 84) pp 1994-2006

GARIBINA, V.A., LEONOV, A.A., DOGADINA, A.V., IONIN, B.I. and PETROV, A.A.

[Abstract] To define the mechanism underlying the reaction of halogenated acetylenephosphonates with anionic nucleophils, a series of reactions involving various nucleophils was analyzed to correlate nucleophilic attack with the basicity of the reagent. Reaction of acetylenechloride phosphonates with  $\text{CH}_3\text{O}^-$  or  $\text{t-BuO}^-$ , for example, leads to rupture of the P-C bond and the formation of the corresponding phosphates, indicating that the nucleophilic attack is on the P atom. Enhancement of nucleophilicity with respect to sp-hybridized carbon atom follows the basicity sequence of alcoholates > phenolates > thiolates > organic and inorganic acid salts. Halosubstitution reactions with retention of the triple bond were obtained only on reaction with acetylenechloride phosphonates with sodium thiolates and phenolates, i.e., with nucleophils with intermediate basicity. Regioisomeric 1,2- and 2,2-di(ethylthio)ethenephosphonates were obtained by nucleophilic and radical addition of ethyl mercaptan to ethylthioacetylene phosphonate, and regioisomeric chloroethyl-thioethenephosphonates by addition to the acetylenechloride phosphonate. Reaction of the latter with monosodium salts of 1,3-diols led to phosphorylated 1,3-dioxolanes, representing a novel class of organo-phosphorus compounds. Figures 3; references 14: 9 Russian, 5 Western.  
[179-12172]

## ACETYLATION OF PHOSPHONOALKYLFURANS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85  
(manuscript received 7 Dec 84) pp 2006-2009

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[Abstract] Acetylation of phosphonoalkylfurans was studied to define the reaction mechanisms and to develop an approach to the synthesis of acetylfurfurylphosphonates. The acetylation of selected phosphonates was conducted with acetic anhydride-phosphoric acid mixture at 95-100°C. Acetylation followed the usual electrophilic substitution pattern and led to the synthesis of 2-diethyl-phosphonoalkyl-4- and -5-acetylfuranes. The 2,5-disubstituted phosphonoalkylfurans were found to be less reactive than their monosubstituted furan congeners. PMR spectra demonstrated that the electronic effects of substituents in position 2 of the furan on position 3 were more pronounced than from position 3 to 4. References 5: 2 Russian, 3 Western.  
[179-12172]

UDC 547.26'118

## PHOSPHORUS-CONTAINING CROWN ETHERS. PART 7. SELECTED N-PHOSPHORYLATED DIAMINODIBENZO-18-CROWN-6 DERIVATIVES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85  
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KUDRYA, T.N., TOCHILKINA, L.M., KAZACHENKO, V.P., RAYEVSKIY, O.A. and PINCHUK, A.M., Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka; Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Synthetic, structural, and characterization studies were conducted on selected phosphorylated analogs of dibenzo-18-crown-6 ethers (I). The compounds under study consisted of diphosphoryl(phosphonyl)amido- and dithiophosphinylamido- derivatives of I prepared by mild synthetic approaches, involving the reaction of cis-diamino-I with chlorophosphates, chlorophosphinates, and chlorothiophosphate. The compounds of interest were stable to hydrolysis at room temperature, and consisted of powdery, pinkish, crystals that dissolved well in organic solvents. They are virtually insoluble in water and ether. Compounds with the  $(C_2H_5O)_2P(O)NH$  group on the benzene ring of I were isolated as two polymorphic forms, differing in the mechanical intermolecular interaction of methylene groups of different molecules within a single crystalline cell. Derivatives possessing the  $(C_6H_5O)_2P(O)NH$  group contained different hydrogen bonds of the  $H \dots O=P$  type. Figures 1; references 10: 8 Russian, 2 Western.  
[179-12172]

## PETROLEUM PROCESSING TECHNOLOGY

### PROGRESS OF AZERBAIJAN OIL, GAS EXTRACTION

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 9, Sep 85 p 1

[Article: "Going Forward, Achieving More"]

[Excerpt] Oilmen and gasmen of Azerbaijan are celebrating their professional holiday in an atmosphere of high labor and political activity brought on by the speech given by CPSU Central Committee general secretary, Comrade M. S. Gorbachev at a conference on scientific-technical progress, in which the paths of the economy's intensification were clearly determined. Dynamic development of the country's fuel and energy complex must play an important role in promoting such progress.

Azerbaijan oil and gas extracting industry is an inherent part of this complex. The party and government attach priority significance to developing extraction of crude hydrocarbons from the Caspian, as is evidenced by the substantial capital investments being channeled into the sector. All of this has produced its positive results. Owing to intensive drilling at the deposit imeni 28 April, the growth of reserves of valuable raw material has increased. There are now 23 wells operating in this area with a total yield exceeding 9,000 tons of oil per day.

This year was marked by the discovery of the deposit imeni Kaverochkin.

The collective of the Kasporneftegazprom All-Union Production Association is successfully fulfilling its planned quotas. In terms of gas extraction, the association is surpassing the quota for the five-year plan by 3.5 billion m<sup>3</sup>. In 7 months of the current year the extraction plan has been surpassed by around 100 million m<sup>3</sup> of gas and more than 32,000 tons of oil.

The geography of prospecting and exploration on land has expanded in recent years. The new Kalamadyn and Muradkhanly deposits have been explored and placed under development, and the Tarsdallyar and Zardob deposits were discovered, attesting to the real prospects for development of oil extraction. But far from all oil and gas extracting administrations have adequately organized their efforts to seek and place reserves into action. The results of 7 months of this year indicate that the collective of the Azneft Association worked below its potential.

In the meantime the experience of the best enterprises indicates that all production tasks may be completed successfully even in old areas that have been under exploitation for a long period of time, when the diverse work is carried on with engineering competency. An example of this is the Karadagneft Petroleum and Gas Extraction Administration, where since the beginning of this year the daily yield has risen by an average of 10 tons of oil. Having attained high indicators in the second quarter of this year, its collective won the all-union socialist competition.

The collectives of the Petroleum and Gas Extraction Administration imeni 26 Bakinskiye Komissary and Neftechalanefit are celebrating their professional holiday with substantial successes in labor.

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CSO: 1841/193

## DEPOSIT IMENI KAVEROCHKIN IN CASPIAN SEA

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 9, Sep 85 pp 7-9

[Article by Kh. B. Yusufzade, Kasporneftegazprom All-Union Production Association]

[Excerpts] In 1985 the Kasporneftegazprom All-Union Production Association continued its geological prospecting operations in water basins of the Azerbaijan, Turkmen and Kazakh regions of the Caspian Sea. As we know, in recent years discovery of the deposit imeni 28 April and initiation of its experimental exploitation were the most important result of exploratory operations in the Caspian Sea.

There are now 23 wells in this area with an average daily yield of about 9,400 tons of oil and over 1 million cubic meters of gas. These wells were drilled from permanent platforms No 1, 2, 3 and 4; construction of platforms No 6, 10 and 11, from which drilling of the area by extraction wells will be continued, is now proceeding.

In addition efforts to determine the limits of revealed deposits and find new ones are continuing.

The reserves of hydrocarbons will be estimated prior to the end of 1985 and subsequently confirmed by the USSR State Commission on Mineral Resources.

Discovery of a deposit which was named after Hero of Socialist Labor Mikhail Kaverochkin was the result of subsequent exploratory operations in the western part of the Apsheron-Pribalkhanskaya uplifted zone.

This discovery was a good gift of offshore oilmen to the forthcoming 27th Congress of the Communist Party of the Soviet Union.

The Kaverochkin area is located 35-40 km from the well-known Neftyanyye Kamni deposit, and it is within the composition of structures of the Apsheron-Pribalkhanskaya uplifted zone, where well-known oil and gas deposits are situated from northwest to southeast--Darvin Bar, Artem Island, Gyurgyany Sea, Zhiloy Island, Gryazevaya Sopka, Neftyanyye Kamni, imeni 28 April, East Livanov Bar, Zhdanov Bar and LAM Bar. The sea depth in the area within which the discovered deposit is located increases from southeast to northwest from 120 to 250 m.

On 12 July 1985 during tests on a break in the formation (2,884-2,844 m), a free flow of oil and gas was obtained (more than 300 tons/day and 201,000 m<sup>3</sup>/day through a 12-mm choke at a buffer pressure  $p_{buf}=6$  MPa), heralding discovery of the deposit. The nature of the work of this well provides the grounds for suggesting that the geological and physical characteristics of all beds of the pay section of the Kaverochkin deposit will be similar to the characteristics of the deposit imeni 28 April. This is confirmed by the high oil yield occurring together with low oil density--850 kg/m<sup>3</sup>.

Concurrently in this area, as with the deposit imeni 28 April, the possibility is not excluded that individual gas-condensate deposits are also present in the lower regions of the pay section, in the crests of some horizons of the gas domes.

Prospecting and exploration will be continued on this structure in two directions--delimiting new oil and gas deposits and seeking new ones at depths accessible to a semisubmersible floating rig.

As with the 28 April area, the explored portion of this area will be subjected to drilling without waiting for completion of the deposit's preparation for industrial exploitation--that is, producing wells will be drilled concurrently with drilling the exploratory and prospecting wells. Assignments to planned permanent platforms for drilling the producing wells have been issued.

And so, the deposit has been discovered. Together with the deposit imeni 28 April, it will serve as the foundation for initiating stable growth of oil extraction in Azerbaijan as early as in the 12th Five-Year Plan.

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GAS AND CONDENSATE RECOVERY FROM HETEROGENEOUS GAS-CONDENSATE RESERVOIRS  
DEVELOPED BY WATER DRIVE

Baku AZERBAJDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 9, Sep 85 pp 18-21

[Article by Sh. D. Abasov and F. G. Orudzhaliyev, Azerbaijan SSR IPGNGM]

[Text] Predicting the coefficient of utilization of gas and condensate reserves in the case of a heterogeneous stratum and water drive development of the reservoir is one of the most complex problems of developing gas-condensate deposits. This complexity is predetermined by the complexity of modeling gas and condensate extraction under these conditions, and by the diversity of the factors influencing it. It should be noted that the entire complex of factors may be subdivided into uncontrollable factors (for example stratum permeability, heterogeneity of reservoir properties and so on) and controllable factors. The most important controllable factor is the rate of gas withdrawal from the reservoir.

This article presents some results of research aimed at establishing the influence of the rate of gas withdrawal upon the degree of extraction of gas and condensate from a reservoir. The research was carried out in application to the conditions of a stratum that is heterogeneous in terms of its permeability. A model of a layered stratum was used as the model of the heterogeneous stratum. Elastic water drive was adopted for the reservoir. A hydrodynamic description of the process of displacement of a gas-condensate mixture by water in isolated interlayers toward their common drain is given in [1,6].

It should be noted that the problems of gas and condensate recovery have been the topic of a large number of theoretical and experimental studies. A detailed analysis of research on gas recovery is given in [5,7].

At the same time the published works do not embrace the entire range of changes experienced by the principal natural and production factors influencing gas recovery from reservoirs developed by water drive. There is significant scientific and practical interest in the problems of condensate recovery from gas-condensate reservoirs in the conditions indicated above. A detailed analysis of publications concerned with development of gas-condensate deposits showed that the problems of condensate extraction using water drive have hardly been addressed.

The IPNGM [Institute of Problems of Deep Petroleum and Gas Deposits] of the Azerbaijan SSR Academy of Sciences is conducting integrated research on development of gas-condensate deposits, including on problems associated with their gas and condensate recovery.

The effect of the compressibility properties of the edge water zone, the absolute permeability of the stratum and the rate of gas withdrawal on the coefficient of condensate recovery from reservoirs in strata with homogeneous reservoir properties was demonstrated in [2,3]. The influence of the compressibility of the edge water zone on the final coefficients of gas and condensate recovery in the case of a stratum with heterogeneous permeability was established in [4].

The results of research aimed at establishing the influence of the rate of drainage of a reservoir with heterogeneous permeability upon the final coefficients of gas and condensate recovery are presented below. The layered stratum was assumed to consist of five interlayers differing only in permeability and associated hydrodynamically only at the bottom hole with the extraction gallery. Because the distribution of permeabilities among the interlayers was adopted linear and because their geometry was assumed to be identical, the average permeability  $K_{cp}$  and the ratio of permeabilities of highly permeable interlayers to low-permeability interlayers  $K$  uniquely describes each of the productive strata investigated. The table shows the distribution of permeabilities among the interlayers adopted in the calculations.

$K_{cp}$	$\bar{K}$	Проницаемость пропластков, (1) $\mu\text{м}^2$				
		(2) Номера				
		I	II	III	IV	V
0,1	4	0,04	0,07	0,1	0,13	0,16
	19	0,01	0,055	0,1	0,145	0,19
0,2	4	0,08	0,14	0,2	0,26	0,32

Key:

1. Interlayer permeability,  $\mu^2$       2. Number

The research was conducted with the following initial data:  $p_0=45.4$  MPa;  $C_0=285$   $\text{cm}^3/\text{m}^3$ ;  $m=0.2$ ;  $h=20$ ;  $b=5,000$  and  $l=3,000$  m;  $\rho_{oct}=0.4$ ;  $\beta_B^*=(25.5$  and  $50.99) \cdot 10^{-5}$  1/MPa, where  $p_0$ --initial reservoir pressure;  $C_0$ --initial concentration of concentrate in reservoir gas;  $l, b, h$ --correspondingly the length, width and gas-saturated thickness of the stratum;  $m$ --porosity;  $\rho_{oct}$ --residual saturation of gas-condensate mixture in the water encroachment region;  $\beta_B^*$ --coefficient of compressibility of the edge water zone.

Figure 1 shows the dependence of the coefficients of the final gas and condensate recovery as a function of the rate of gas withdrawal. The final values  $\eta_g$  and  $\eta_c$  were attained when the gas-water surface reached the drain

by way of the most permeable interlayer, or when the weighted average reservoir pressure ( $p_{cp.B}$ ) decreased to 3.92 MPa (solid curves). In cases where  $p_{cp.B}$  had not yet reached 3.92 MPa and the bottom hole pressure ( $p_c$ ) decreased to 1.96 MPa, further exploitation of the reservoir was carried out at a fixed  $p_c$  ( $p_c=1.96$  MPa) and a decreasing rate of gas withdrawal (broken curves).

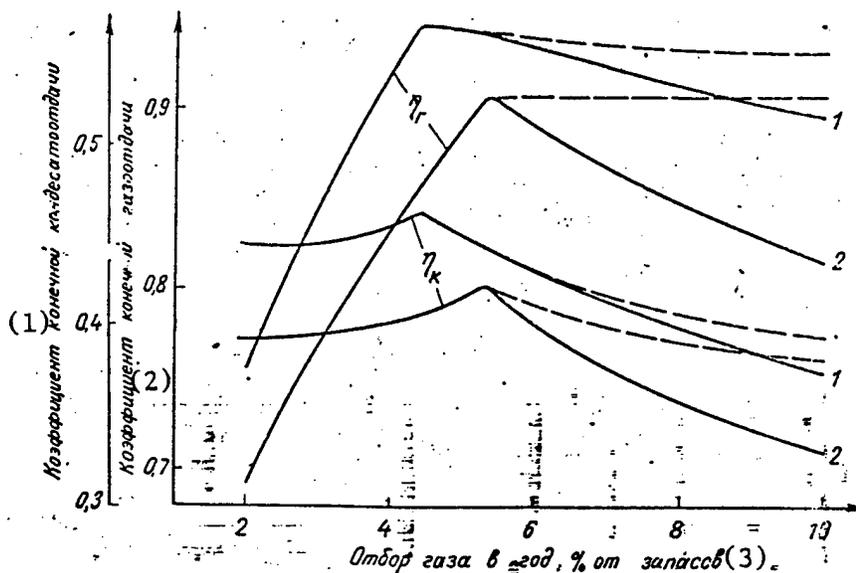


Figure 1: 1,2-- $\bar{K}=4$  and 19

Key:

- |   |  |
|---|--|
| 1. Coefficient of final condensate recovery | 3. Withdrawal of gas per year, % of reserves |
| 2. Coefficient of final gas recovery        |  |

The dependencies shown in Figure 1 were obtained for heterogeneous strata ( $\bar{K}=4$  and 19) with an average reservoir permeability equal to  $0.1 \mu^2$  and a coefficient of compressibility of the edge water zone equaling  $\beta_B^* = 50.99 \cdot 10^{-5}$  l/MPa.

As follows from Figure 1, the heterogeneity of a layered stratum has an influence on the gas and condensate recovery from gas-condensate reservoirs. The more homogeneous the stratum is, the greater is the degree of extraction of gas and condensate.

As we can see, the dependencies of  $\eta_g$  and  $\eta_c$  on the gas withdrawal rate are complex in nature.

It should be noted that some specialists maintain a fully definite opinion concerning the influence of the rate of gas withdrawal on gas recovery from

natural gas deposits developed by water drive. It is believed that the higher the rate of gas withdrawal, the higher is the gas recovery. But this is not entirely so. The maximum gas recovery is insured by developing the reservoir at a gas withdrawal rate at which a decrease in reservoir pressure to a minimum permissible value is achieved by the end of its exploitation simultaneously with approach of the gas-water surface to the last row of producing wells. The maximum points on the curves for  $\eta_g$  (see Figure 1) correspond namely to the variant in which the two criteria for completed exploitation of reservoirs are satisfied simultaneously. The left branches of the curves describe the variants of development which end with penetration of water through the most permeable interlayer.

An analysis of the dependencies in Figure 1 from the standpoint of the influence of the withdrawal rate per se (continuous curves) would show that when reservoirs are exploited at a constant gas withdrawal rate, there is always one and only one withdrawal rate insuring maximum gas extraction under the given conditions. As we can see, in variants with declining extraction of gas toward the end of development (broken curves), the gas recovery is only a little lower than maximum.

The influence of reservoir drainage rate on condensate recovery in the case of a water zone with high compressibility is not great. While within the limits of the conditions examined here the maximum difference in the  $\eta_g$  values was 21 percent, for  $\eta_c$  this value barely exceeded 4 percent. It is typical in this case that the maximum points of  $\eta_c$  and  $\eta_g$  in the gas withdrawal rate function practically coincided.

Figure 2 shows the dependencies for  $\eta_c$  and  $\eta_g$  in relation to two values of  $K_{cp}$  (see table), but with  $\beta_B^*$  being half its former size ( $\beta_B^* = 25.5 \cdot 10^{-5}$  1/MPa). The degree of heterogeneity of the layered stratum is  $K=4$ .

As we can see,  $K_{cp}$  has a noticeable influence on gas and condensate recovery. In this case in the range of low gas withdrawal rates  $K_{cp}$  has a greater influence on  $\eta_g$ , while in the range of higher withdrawal rates its influence is greater on  $\eta_c$ . Typically at a gas withdrawal rate below 4.75 percent per year in relation to the initial reserves, a higher average permeability corresponds to lower values for final gas recovery. This is associated with entrapment of gas at high pressure. At a gas withdrawal rate less than 3 percent the condensate recovery from a stratum for which  $K_{cp} = 0.2 \mu^2$  is somewhat lower than for a stratum for which  $K_{cp} = 0.1 \mu^2$ . In variants in which the process stops due to pressure at both  $K_{cp}$ , a greater  $K_{cp}$  always corresponds to larger values of  $\eta_g$  and  $\eta_c$ . On the whole, the larger  $K_{cp}$  is, the wider is the interval of change of  $\eta_g$  in the gas withdrawal rate function. By comparing curves 1 in figures 1 and 2 we can evaluate the influence of the compressibility of the water-bearing region  $\beta_B^*$  on gas and condensate recovery.

First, the lower  $\beta_B^*$  is, the smaller is the number of possible variants of development that end with flooding of the stratum. Second, the lower  $\beta_B^*$  is, the less  $\eta_g$  depends on the gas withdrawal rate.

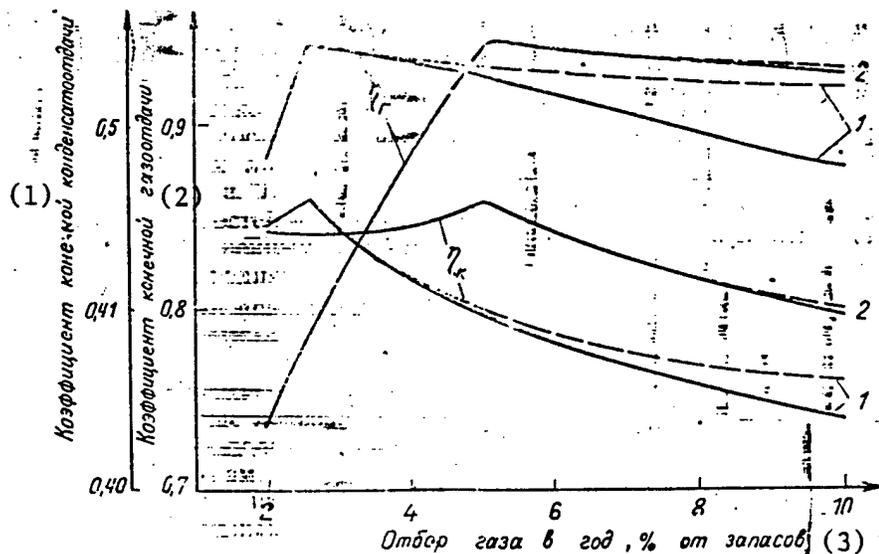


Figure 2. 1,2-- $K_{CP}=0.1$  and  $0.2 \mu^2$

Key:

- |   |  |
|---|--|
| 1. Coefficient of final condensate recovery | 3. Withdrawal of gas per year, % of reserves |
| 2. Coefficient of final gas recovery        |  |

Condensate recovery reacts in a different way to change in  $\beta_B$ . The lower the compressibility of the water-bearing region, the wider is the interval of change of  $\eta_C$  in the gas withdrawal rate function.

Thus hydrodynamic methods of modeling development of gas-condensate reservoirs by elastic water drive in heterogeneous strata were used to study the basic patterns of change in recovery from the subsoil under the influence of different factors. It was demonstrated in this case that in the conditions under examination, an optimum rate of gas withdrawal insuring the largest possible values of the final gas and condensate recovery exists in relation to each compressibility value, each weighted average permeability of a heterogeneous stratum and each permeability distribution. Moreover the materials presented here make it possible to evaluate how much the negative influence of unfavorable natural factors could be reduced through correct utilization of the principal controllable factor--the gas withdrawal rate.

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11004

CSO: 1841/193

UDC 665.63.048.003

ASSESSMENT OF FUEL DISTILLATES AT ORSKNEFTEORGSIINTEZ REFINERY LABORATORIES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 85 pp 4-8

MEDEM, V.M., KALININ, A.A., KAMINSKIY, E.F., DEMIDENKO, K.A.,  
YELISEYEVA, YeN. and MAYSTER, I.A., All-Union Scientific Research Institute  
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[Abstract] In view of the variability in oil available to refineries for the production of motor fuels, an evaluation method has been developed based on the sum total of light petrochemicals that can be derived, i.e., the 28-350(360)<sup>o</sup>C fractions. Nomograms have been developed for the formation of a given fuel based on the distillate fraction, with the following designations: fractions 28-180<sup>o</sup>C for gasoline, 100-250<sup>o</sup>C for kerosene, 110-380<sup>o</sup>C for summer diesel fuel, 180-360<sup>o</sup>C for summer diesel fuel, and 250-310<sup>o</sup>C also as a possible fraction for summer diesel fuel. Fractional composition data are summarized for a number of crude oils from different deposits over a 1977-1984 time frame. The multivariant analyses demonstrated that motor fuel can be increased by careful analysis of the crude oil potential based on its light fractions. Figures 2; references: 3 (Russian).  
[188-12172]

UDC 620.197.3

ETHOXYLATED CAPROLACTAM AND BENZOTRIAZOLE: SYNTHESIS AND METAL PROTECTION

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 85  
pp 15-16

KUZINOVA, T.M., ALTSYBEYEVA, A.I. and YAVSHITS, G.A., "Lenneftekhim"  
Scientific Production Association

[Abstract] Caprolactam and benzotriazole were ethoxylated at 40-70<sup>o</sup>C with ethylene oxide, using sodium hydroxide as the catalyst, either in water or in water-alcohol mixtures, and the ethoxylated products assessed for metal protectiveness. Studies with steel U10, copper M3, and lead Cl in salt solutions (NaCl, or Na<sub>2</sub>SO<sub>4</sub> for Pb) showed that the unmodified caprolactam

did not protect steel or lead, and had only a slight anticorrosive effect on copper. Benzotriazole protected copper from corrosion, was indifferent with respect to steel, and had no protective effect on lead. Ethoxylated caprolactam and benzotriazole prevented corrosion of steel. Ethoxylation of benzotriazole reduced its protectiveness of copper, but transformed it into an anticorrosive agent for lead. Derivatized caprolactam was less effective as an anticorrosive than ethoxylated benzotriazole, but somewhat effective in the protection of lead depending on the degree of ethoxylation. The anticorrosive effectiveness for steel of ethoxylated benzotriazole was markedly enhanced by the presence of  $H_2S$  in the system. Figures 1; references: 2 (Russian).

[188-12172]

UDC 665.644.2.097.38:66.096.097.1

#### KINETICS OF CO OXIDATION ON SOLID PROMOTER IN REGENERATION OF CRACKING CATALYST

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 85  
pp 17-19

SOLYAR, B.Z., ZHITOMIRSKIY, B.M., MELIK-AKHNAZAROV, T.Kh. and MARKHEVKA, V.I.,  
NII NP [Scientific Research Institute of the Petroleum Industry?]

[Abstract] An analysis was conducted on the oxidation of CO over a regenerated KMTs-R catalyst using a solid KO-9-type promoter. The reaction was conducted under pilot plant conditions using a gas mixture of  $CO + O_2 + N_2$  passed through the fluidized bed of the catalyst over a temperature range of 450-700°C. The apparent energies of activation at 440-520°C and at 520-660°C were calculated at 177 and 19 kJ/mole, respectively. This was explained by the assumption that at temperatures below 440°C virtually the entire active area of platinum was occupied by adsorbed CO, leading to inhibition of the reaction. An increase in temperature favored desorption of the CO molecules and reversible adsorption of  $O_2$  on the free active centers, thereby facilitating oxidation of the gaseous CO. Thus, at 440-520°C the limiting stage in the oxidation of CO was desorption of CO. A kinetic model for the reaction was advanced which satisfied the experimental data on CO oxidation on the solid promoter at 520-660°C under approximately atmospheric pressure. Figures 4; references 11: 6 Russian, 5 Western.

[188-12172]

RHEOLOGIC CHARACTERISTICS OF MINERAL OIL SUPPLEMENTED WITH POLYBUTADIENE-STYRENE COPOLYMER

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 85  
pp 35-36

NATOV, M. and PAVLOV, D., VTU [expansion unknown] imeni A. Kunchev, Ruse, Bulgaria; VKhTI [expansion unknown], Sofia, Bulgaria

[Abstract] An assessment was made of the rheologic properties of 20W40 oil supplemented with 2% polybutadiene-styrene copolymer of 90,000 MW, in relation to temperature and engine displacement rate. Analysis of data for a temperature range of -10 to 100°C and a displacement rate of  $0.4-10^5 \text{ sec}^{-1}$  demonstrated that the difference between the maximal and minimal viscosities diminished as the temperature rose. The ratio of maximal to minimal viscosity for SK-1 20W40 oil thickened with the copolymer changed from 2.34 at -5°C to 1.08 at 100°C. At higher temperatures the ratio was close to unity. These changes assure efficient lubrication of internal combustion engines at all temperatures of operation. Figures 3; references 3: 1 Russian, 2 Western.  
[188-12172]

UDC 665.765-404.028.2

HIGHLY ALKALINE MAGNESIUM ALKYL PHENOLSULFONATE AS ADDITIVE FOR ENGINE OILS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 85  
pp 43-44

SADYKHOV, K.I., VELIYEVA, S.M. and AGAYEV, A.N., Chemical Industry Institute, Azerbaijan SSR Academy of Sciences

[Abstract] A highly alkaline, low ash, magnesium alkyl phenolsulfonate was prepared for use as additive to diesel motor oils. Designated as IKhP-227 and used in a concentration of 2.5% in motor oil M-10G<sub>2</sub>, it was found to be a suitable replacement for additives used in higher concentrations (5.8% PMS-A, 6% NP-360). IKhP-277, in addition to offering equivalent or superior protection against corrosion, wear, oxidation, and possessing both detergent and emulsifying properties, also reduced the ash content of the oil by 25%.  
References: 5 (Russian).  
[188-12172]

## PROTECTIVE EFFECTIVENESS OF LUBRICATING AND PRESERVATION ENGINE OILS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 85  
pp 13-14

ENGLIN, A.B., KOZHEKIN, A.V., IVANOVA, T.N. and TISHINA, Ye.A.

[Abstract] Assessment was conducted on the protective effectiveness of several lubricating and preservation engine oils, using seven State Standard (GOST) tests, to determine the feasibility of running internal combustion engines after storage without removal of the preserving or storage oils. Trials with dual-function (lubrication and preservation) oils with and without addition of corrosion inhibitors demonstrated that the M-8A, MT-16n, and M-20Bp oils were 2- to 3-fold as effective as standard engine oils with corrosion inhibitors (Akor-1, KP, or MSDA-1), and 5- to 10-fold as effective as the standard engine oils lacking such inhibitors.

References: 6 (Russian).

[188-12172]

UDC 661.71:66.092.147.3

## PYROLYSIS OF NAPHTHENIC HYDROCARBONS

Moscow NEFTEKHIMIYA in Russian Vol 25, No 5, Sep-Oct 85 (manuscript received 8 Jan 85) pp 615-620

KHARITONOV, B.Ye., VOLOKHOVA, G.S., VASILYEVA, I.I., KHRAMOVA, E.V. and MUKHINA, T.N., All-Union Scientific Research Institute of Organic Synthesis; Moscow Institute of Petrochemical and Gas Industry imeni I.M. Gubkin; All-Union Scientific Research Geological Prospecting Petroleum Institute

[Abstract] The increasing use of heavy hydrocarbon fractions in pyrolysis feedstock requires detailed study of the behavior of the various high molecular weight hydrocarbons found in these fractions. Published data on the pyrolysis of individual paraffinic hydrocarbons indicates that the polycyclic aromatic and naphthenic hydrocarbon content found in the heavier crudes seem to "inhibit" formation of ethylene from other hydrocarbons, but information on the behavior of polycyclic naphthenes having three or more rings is lacking. In the present work, a study of the pyrolysis of cyclohexane, decaline, adamantane, and naphthenic concentrates containing polycyclic naphthenes shows that the polycyclic hydrocarbons form lower olefins and monocyclic aromatics and the ethylene yield resulting from the naphthenes is about 80% of the total. Addition of polycyclic naphthenes to the oil fraction has no "inhibiting" effect on the formation of lower olefins. Mass spectrometry shows that the naphthenes present in a naphthene concentrate have a sterane structure and contain 2-3 alkyl substituents of 1-2 carbon atoms in length and one substituent of 5-8 carbon atoms. Figures 3; references 7: 6 Russian, 1 Western.

[198-12765]

## INHIBITION OF COKE FORMATION DURING PYROLYSIS OF HYDROCARBONS

Moscow NEFTEKHIMIYA in Russian Vol 25, No 5, Sep-Oct 85 (manuscript received 21 Jan 85) pp 627-634

YEGIAZAROV, Yu.G., CHERCHES, B.Kh. and POTAPOVA, L.L., Institute of Physical Organic Chemistry, BSSR Academy of Sciences

[Abstract] Low molecular weight hydrocarbons are obtained chiefly by pyrolysis of hydrocarbon feedstock in a pipe furnace, but the severe reaction conditions used to intensify the process promote coke formation which increases hydraulic resistance, overheating, carbon in the metal structure, and corrosion in the heating coil surfaces. A review of the literature on inhibition of coke formation during hydrocarbon pyrolysis shows that while many conclusions are contradictory and empirical, convincing experimental evidence does exist for a consecutive polymerization, condensation, and dehydrogenation scheme. Hydrocarbon decomposition may take place on a metal surface, especially nickel, via a carbide cycle mechanism. Inhibitor effectiveness may be ranked  $S > B > P \approx Bi$ , the high effectiveness of sulfur being due to the ease of metal sulfide formation and inhibition of polymerization. Other inhibitors are organophosphorus and siliconorganic compounds, polysiloxanes, fatty acid derivatives, hydrogen, ammonia, oxides of nitrogen, alkali metal salts and hydroxides, and heterogeneous catalysts such as iron/chromia/potassia, potassium vanadate plus additives, and indium oxide plus additives. Water soluble salts such as  $K_2CO_3$ , KOH, or  $K_2SO_4$  tend to form deposits on the supply duct surfaces, while  $NH_3$ ,  $NO_2$ , and organic sulfur compounds require additional treatment to remove them from the end product. These problems can be eliminated through the use of hydrogen. Catalytic systems having maximum coke inhibiting properties and providing selective gasification of condensation products may be used for pyrolysis of heavy feedstocks, which is becoming a pressing problem. References 71: 50 Russian, 21 Western [198-12765]

UDC 661.666:661.716.11:661.716.2.32:541.127

## FORMATION AND GASIFICATION OF PYROCARBON DURING PYROLYSIS OF HYDROCARBON-STEAM MIXTURES

Moscow NEFTEKHIMIYA in Russian Vol 25, No 5, Sep-Oct 85 (manuscript received 29 Aug 84) pp 635-639

TESNER, P.A. and SHEIN, O.G., All-Union Scientific Research Institute of Gas

[Abstract] An experimental study was made of the effects of steam on pyrocarbon formation and its gasification with steam. Two series of experiments

were conducted to determine the rate of pyrocarbon formation from a binary mixture of hydrocarbon and steam and the rate of steam gasification of pyrocarbon as obtained from methane and ethylene. The first series of experiments were modeled after processes taking place on the walls of tubular pyrolysis reactors and the second after steam gasification of pyrocarbon as formed in a reactor during pyrolysis. The experiments demonstrated that no significant increase in pyrocarbon surface takes place if the hydrocarbon concentration is high enough. Gasification of pyrocarbon obtained from ethylene is considerably higher than that obtained from methane. Figures 3; references: 4 (Russian).  
[198-12765]

UDC 547.496/621.892.8

ACETOXYMETHYL ESTERS OF XANTHOGENIC, DIALKYLDITHIOCARBAMIC AND O,O-DIALKYLDITHIOPHOSPHORIC ACIDS AS ANTIWEAR ADDITIVES TO LUBE OILS

Moscow NEFTEKHIMIYA in Russian Vol 25, No 5, Sep-Oct 85 (manuscript received 30 Oct 84) pp 679-683

KULIYEV, A.M., KULIYEVA, M.A., KULIBEKOVA, T.N. and IBADZADE, A.K.,  
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[Abstract] The presence of sulfur, phosphorus, and nitrogen in esters of xanthogenic, dithiocarbamic, and O,O-dialkyldithiophosphoric acids makes these compounds useful as lube oil additives. Experiments show that alkyl esters of these acids can be made more effective by introducing polar, especially mixed ester, groups into the acids. In the present work, six new acetoxymethyl esters of the above acids were synthesized, and their effects on the antiwear and antipitting properties of lube oils were studied. The esters were prepared by reaction of chloromethyl acetate with alkali metal salts of the acids and the structure confirmed by IR- and PMR-spectra. Acetoxy esters of O,O-dialkyldithiophosphoric acid have good antiwear and antipitting properties surpassing those of the alkyl esters of the corresponding acids and the well-known antipitting additive LZ-23k. References: 4 (Russian).

[198-12765]

INFLUENCE OF CRACKING OF MERCAPTANS ON SERVICE LIFE OF ZEOLITE IN PROCESSES  
OF ADSORPTION PURIFICATION OF NATURAL GAS OF SULFUR COMPOUNDS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 9, Sep 85  
(manuscript received 19 Jun 84) pp 2130-2132

KUZMENKO, N.M., AFANASEV, Yu.M., BUDKINA, M.I., GERASIMOVA, N.Ye.,  
GOROKHOVA, G.V. and BREKHNER, S.A., State Scientific Research Institute  
for Commercial and Sanitary Purification of Gases

[Abstract] A study is reported of the kinetics of coking of NaX zeolite by decomposition of ethylmercaptan and an estimate is given of the decrease in adsorption capacity of the zeolite as a result of coking. Experiments were performed in a glass reactor 2 cm in diameter containing NaX zeolite crushed to a size of 1-2 mm. The zeolite was heated to 320°C and purified nitrogen containing ethylmercaptan vapors 80-100 g/nm<sup>3</sup> were passed through. The contact time of gas with zeolite was varied between 1 and 90 seconds. The decomposition products were chromatographically analyzed. Under all conditions, there were no mercaptans in the gas downstream from the reactor, i.e., its degree of decomposition was 100 percent. Only hydrogen sulfide and diethyl sulfide were detected in the decomposition products. The rate of coking of the zeolite decreased with increasing content of coke and poisoning of the active centers. The content of coke determined the adsorption capacity of the zeolite regardless of mercaptan decomposition conditions. An equation is presented which can be used to estimate the rate of deactivation of the zeolite and thus establish the service life of the adsorbent. Figures 4; references: 6 (Russian).  
[191-6508]

UDC 553.982

DETERMINATION OF PARAMETERS OF AREA OUTSIDE CONTOUR IN LATE STAGES OF  
EXPLOITATION OF PETROLEUM DEPOSITS

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 9, Sep 85  
pp 21-25

MINCHUK, M.A., AzSSR Geology Administration

[Abstract] A study of the parameters of the area beyond the contour in an oil deposit is of great interest in connection with the use of stratal water won from oil deposits as an industrial raw material. The parameters of the area outside the contour can be reliably determined in the late stages of exploitation. The parameters of this water-bearing area can be calculated using an elastic mode equation in the later stages of exploitation. This article suggests a slightly altered method of computation based on the fact that most of the water won is from the area outside the contour

and that the decrease in its levels which occurs with time results primarily from a drop in pressure in this area. Equations for the calculation are presented. The calculation method can be used only for regional estimates of reserves and in the prospecting stage of the search for industrial water. Figures 1; references: 3 (Russian).  
[192-6508]

UDC 665.644.2:665.637

#### CATALYTIC PROCESSING OF MAZOUT ON GEL CATALYST

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 9, Sep 85  
pp 45-47

SEID-RZAYEVA, E.M. and RUSTAMOV, M.I., Institute of Petrochemical Industry,  
AzSSR Academy of Sciences

[Abstract] At the authors' institute, in order to remove sulfur, salts, nitrogen, oxygen, metals, and other compounds from mazout, a new method has been suggested for catalytic processing on a synthesized gel catalyst with subsequent cracking of the purified product on a gel zeolite-containing catalyst. Studies were performed in a fluidized bed<sub>1</sub> reactor at 500-520°C with a mass velocity of raw material input of 2.5 hr<sup>-1</sup>. The product following catalytic processing differs from the initial mazout and is promising for vacuum distillation. Results of spectral analysis of the 200-540°C fraction after catalytic treatment indicated this fraction contains an order of magnitude less vanadium, iron, copper and two orders of magnitude less nickel and sodium than the initial product. Coking capacity and resin content are also significantly decreased. Following catalytic cracking at 500°C, the sum of light components was 67.95% for the 200°C fraction, 68.86% for the 350°C fraction, which had a yield of gasoline of 25.7%. The octane number of the gasolines produced by the motor method was 79.0. References 5: 3 Russian, 2 Western.  
[192-6508]

UDC 62--50:007:65

#### MATHEMATICAL MODELING AND OPTIMIZATION OF PROCESS OF DEHYDROGENATION OF ETHYLBENZENE TO STYRENE IN PRESENCE OF ATMOSPHERIC OXYGEN

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 9, Sep 85  
pp 47-49, 56

ABILOV, A.G., ALIYEV, V.S., ALIYEV, K.A. and ALIYAROV, R.I., Institute of the Petrochemical Industry, AzSSR Academy of Sciences

[Abstract] A mathematical model is suggested allowing simultaneous investigation of the basic characteristics of the process of dehydrogenation

of ethylbenzene, determination of the characteristics and basic features of technological systems. The parameters of the model were calculated by the method of maximum likelihood based on the results of laboratory experiments. Production optimization was based on the criterion of adjusted cost with the presence of limitations on the input, control, and output parameters resulting from both technological and economic considerations. The optimization problem was reduced to an unconditional minimum problem. Figures 1; references: 5 (Russian).  
[192-6508]

UDC 547.599.6

RITTER REACTION OF 5,5,6-TRIMETHYLBICYCLO[2.2.1]HEPTANE-2-EXO-OL WITH ACETO- AND BENZONITRILE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85  
(manuscript received 3 Jan 85) pp 2097-2100

KOZLOV, N.G., NESTEROV, G.V. and MAKHNACH, S.A., Institute of Physicoorganic Chemistry, Belorussian SSR Academy of Sciences, Minsk

[Abstract] Studies were conducted on the Ritter reaction as applied to the interaction of isocamphanol (5,5,6-trimethylbicyclo[2.2.1]heptane-2-exo-ol) with aceto- and benzonitrile. The respective products of this reaction were N-acetyl and N-benzoyl-1,7,7-trimethylbicyclo[2.2.1]hept-2-ylamine. The formation of the latter compounds was ascribed to a Wagner-Meerwein rearrangement. References 8: 2 Russian, 6 Western.  
[179-12172]

UDC 547.922.5+532.783+541.128.36

MESOMORPHOGENS. PART 5. SYNTHESIS OF 3 $\beta$ -ALKOXY- AND 3 $\beta$ -PHENYLOXYCARBONYLMERCAPTOCHOLEST-5-ENES: ROLE IN STABILIZATION OF LIQUID CRYSTAL COMPOSITIONS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85  
(manuscript received 2 Aug 84) pp 2130-2135

BOGATSKIY, A.V. (deceased), GALATINA, A.I., YAROVY, Yu.K., KILIMENCHUK, Ye.D. and KUZIN, V.F., Physicochemical Institute imeni A.V. Bogatskiy, Ukrainian SSR Academy of Sciences, Odessa

[Abstract] A series of previously undescribed 3 $\beta$ -alkyl-, 3 $\beta$ -p-phenyl, and 3 $\beta$ -cyclohexyloxycarbonylmercaptocholest-5-enes were synthesized by condensation of 3 $\beta$ -chlorocarbonylmercaptocholest-5-ene with the corresponding alcohols and phenols in absolute benzene. Mesomorphic properties were exhibited by the newly synthesized compounds in polarization microscopy, with phase transition temperatures summarized in tabular form. Each of the compounds possessed a liquid crystalline phase. In addition, 3 $\beta$ -p-nitrophenyl- and 3 $\beta$ -cyclohexyloxycarbonylmercaptocholest-5-ene exerted a

prolonged stabilizing effect on the three-component composition liquid cholesterol crystals, consisting of 61% cholesterylperlargonate, 32% cholesteryloleate, and 7% cholesterylbenzoate. Figures 2; references 7: 3 Russian, 4 Western.  
[179-12172]

UDC 547.245+615.357

TERT-BUTYLDIMETHYLSILYLATED KETOSTEROID ENOLS. PART 2. TERT-BUTYLDIMETHYLSILYLTRIFLATE SYNTHESIS OF  $\Delta^{4-3-}$ -KETOSTEROID  $\Delta^{2,4-}$ -DIENOLS; BASE-EFFECTS ON ENOLIZATION

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 9, Sep 85  
(manuscript received 22 Oct 84) pp 2150-2151

KORENCHUK, Ye.N., GOLUBOVSKAYA, L.Ye. and PIVNITSKIY, K.K., Institute of Experimental Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow

[Abstract] Tert-butyldimethylsilyltriflate (I) was employed for the enolsilylation of testosterone, 17 $\alpha$ -methyltestosterone, and progesterone in the presence of collidine, yielding largely the  $\Delta^{2,4-}$ -dienol derivatives with a small (1-15%) admixture of  $\Delta^{3,5-}$ -dienols. In the presence of aliphatic tertiary amines 0.7-1.5:1 mixtures of the  $\Delta^{2,4-}$ - and  $\Delta^{3,5-}$ -derivatives were obtained. Analogous effects of the bases were observed in the enolsilylation of 19-nortestosterone and 17 $\alpha$ -ethinyl-19-nortestosterone. References 3: 1 Russian, 2 Western.  
[179-12172]

UDC 547.787.3:543.422

SYNTHESIS OF N-SUBSTITUTED BENZOXAZOLONES-2

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 9, Sep 85  
(manuscript received 15 Oct 84) pp 1185-1188

KALCHEVA, V., LOZANOVA, Kh., SIMOV, D. and TEREITYEV, P.B., Sofia University imeni Cl. Okhridskiy Sofia, Bulgaria; Moscow State University imeni M.V. Lomonosov, Moscow

[Abstract] Beckman rearrangement of anti-oximes 3-acetonylbenzoxazolones-2 was used to obtain 3-acetylaminoethylbenzoxazolones-2. The compounds isomeric to the acetylaminomethylbenzoxazolones-2, 3-(N-methylcarbamoylmethyl) benzoxazolones-2, were synthesized by alkylating the benzoxazolone-2 with chloroacetic acid. The acids obtained, 3-oxycarbonylmethylbenzoxazolones-2 were treated further with thionyl chloride and methylamine to transform them into

chloranhydrides and eventually N-methylamides. The infra-red spectrums of the compounds were taken on UR-10 in a KBr tablet. The paramagnetic resonance spectrums were taken on a BS-487-S at 80 MHz in a solution of DMSO. Mass-spectrums were obtained on a Varian MAT-111. References 9: 2 Russian, 7 Western.  
[160-13050]

UDC 547.447(088.8)

#### SYNTHESIS AND PHARMACOLOGIC ACTIVITIES OF GAMMA-HYDROXYCARBOXYLIC ACID HYDRAZIDES

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 38, No 8, Aug 85  
(manuscript received 18 Jul 84) pp 523-525

ARUTUNYAN, V.S., KOCHIKYAN, T.V., KOVALEV, G.V. and BUGAYEVA, L.I.,  
Yerevan State University; Volgograd State Medical Institute

[Abstract] High yields of 4-hydroxy-5-alkoxypentanoic acid hydrazides were obtained by the reaction of selected lactones with hydrazine hydrate. The hydrazides were found to be moderately spasmolytic, and, in nembutalized rats, reduced arterial blood pressure by 10-52% when administered in doses of 5-100 mg/kg. Each of the hydrazides was also shown to be highly toxic. References 3: 2 Russian, 1 Western.  
[182-12172]

UDC 615.281:547.835.1].015.4.074

#### QUANTUM CHEMICAL EVALUATION OF BASICITY OF ACRIDINE DERIVATIVES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 10, Oct 85  
(manuscript received 22 Oct 84) pp 1216-1218

PEDASH, V.F. and GAYDUKEVICH, A.N., Kharkov Pharmaceutical Institute

[Abstract] An attempt was made to evaluate the possibility of determining pK of monosubstituted acridines as a function of substituent location in the molecule, based on the theory of molecular orbital perturbation. The formula derived showed that pK varies with the position of an aminogroup; it was highest in 9-aminoacridine and decreased in the following order of substitution: 3, 1, and 2. Theoretical values agreed well with experimental data. Hope is expressed that this approach could be used in other biologically active systems. References 4: 2 Russian (both by Western authors), 2 Western.  
[205-7813]

## PROCESS DEVELOPMENT FOR PREPARATION OF SULFALENE SUSPENSION USING ROLLER EQUIPMENT

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 10, Oct 85 (manuscript received 28 Sep 84) pp 1225-1228

ALTUKHOVA, L.B., ALFEROVA, L.I., ANDREYEV, B.V., BALABUDKIN, L.A., KLIMOV, L.A., MARCHENKO, N.P., OSIPOV, V.F., SKORYKH, V.A. and TANKYAN, N.G., Leningrad Chemical Pharmaceutical Institute; All-Union Scientific Research Chemical Pharmaceutical Institute imeni S. Ordzhonikidze, Moscow

[Abstract] Dispersion technology determines effectiveness of suspension-type drugs. A 2% suspension of sulfalene is a long-lasting drug for pediatric use. The approved methods for its preparation (dry and wet milling in ball, colloidal, and flow mills) do not assure the necessary dispersion of the solid phase. Preliminary results showed that the most rational method for grinding sulfalene particles should be based on roller-type equipment in which mechanical breakdown of the particles occurs together with hydromechanical action. Dispersion intensity is affected by the rpm of the rotor, sulfalene content in the suspension, and the composition of liquid phase. Comparative analysis was performed of the process carried out on roller apparatus and on a ball mill. For commercial use, a multistage roller apparatus should be employed. Figures 3; references: 4 (Russian).  
[205-7813]

UDC 615.015.1

## PREDICTION OF TOXICITY OF 8-AZASTEROIDS BY MEANS OF PRINCIPAL COMPONENTS METHOD

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHESKIKH NAVUK in Russian, No 5, Sep-Oct 85 (manuscript received 26 Dec 84) pp 60-63

SOKOLOV, Yu.A., GOLUBOVICH, V.P. and AKHREM, A.A., Institute of Bioorganic Chemistry, BSSR Academy of Sciences

[Abstract] In continuation of previous work, toxicity of 8-azasteroids was studied as a function of principal components determined from quantum chemical parameters characterizing electronic structure of these molecules and obtained from expanded Huckel method. On the basis of multiple regression analysis of these principal components, two were found which affected LD<sub>50</sub> to the greatest extent: distribution of electronic density in ring A and local redistribution of electronic density between atoms 2 and 3. Theoretical values were compared with experimentally determined ones (the work was done at the Division of Biological Studies, Institute of Bioorganic Chemistry, BSSR Academy of Sciences). References 11: 8 Russian, 3 Western.  
[216-7813]

UDC 542.952

PHOTOPOLYMERIZATION OF METHYL METHACRYLATE IN SOLUTION INITIATED BY OLIGOURETHANE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 10, 1985  
(manuscript received 24 May 84) pp 1087-1093

MASLYUK, A.F., KERCHA, S.F. and GRISHCHENKO, V.K., Institute of Chemistry of High Molecular Weight Compounds, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] An analysis was conducted on the kinetics of photopolymerization of methyl methacrylate initiated by  $\alpha,\omega$ -bis- $[\alpha$ -phenyl- $\alpha$ -(2,4-toluylenediurethane)acetophenone]-oligo(hydroxypropylene)<sub>34</sub> glycol (I). The reaction was analyzed from UV spectra and viscosity of the solution. With 8-15 wt% conversion of methyl methacrylate, the order of the reaction was 0.56 in I and 1.08 in the monomer. These values indicated a stationary form of polymerization and the absence of side reactions, as well as the fact that breakage of the growing chain proceeded as a bimolecular reaction. The overall energy of activation for the process was calculated at 45 kJ/mole in the temperature interval of 298-318°K, while that for the activation of photoinitiation was calculated at 55.3 kJ/mole. The latter value suggests a considerable contribution of diffusion factors due to the use of an oligomeric photoinitiator. Figures 3; references 14: 9 Russian, 5 Western.  
[194-12172]

UDC 547.583.1:541.127

CATALYTIC EFFECTS OF TERTIARY AMINES IN URETHANE FORMATION

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 10, 1985  
(manuscript received 18 May 84) pp 1093-1096

VESELOV, V.Ya., GREKOV, A.P. and ZHURILO, A.A., Institute of Chemistry of High Molecular Weight Compounds, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] To define the catalytic effects of tertiary amines on the reaction of isocyanates with nucleophilic reagents, studies were conducted with various tertiary amines in relation to the reaction of benzenesulfohydrazine with phenyl isocyanate at 25°C. The reaction followed second

order kinetics, with triethylenediamine possessing the most catalytic activity. N,N-Dimethylaniline showed the least catalytic activity, with a positive linear relationship prevailing between the plots of  $\log k$  and  $pK_a$  of the tertiary amines. IR spectroscopy indicated that the tertiary amines form associates with isocyanates, and that the latter -- due to the electron acceptor characteristics of the tetravalent nitrogen atom bound to the isocyanate group -- react more rapidly with benzenesulfohydrazine than the phenyl isocyanate. In addition, the mechanism of nucleophilic catalysis was confirmed by the sensitivity of the reaction to steric characteristics of the amines, which was greater than sensitivity to the induction effects of aliphatic substituents on the nitrogen atom. Figures 3; references 11: 10 Russian, 1 Western.  
[194-12172]

UDC 618.043.3:678.7

#### MODIFICATION OF PYROPHYLLITE BY SURFACE POLYMERIZATION OF BUTYL METHACRYLATE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 10, 1985  
(manuscript received 6 Jun 84) pp 1100-1104

KOCHETOV, D.P., DRYAGILEVA, R.I., IVANOVA, T.S. and GRITSENKO, F.R.,  
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Academy of Sciences, Kiev

[Abstract] In order to improve the compatibility of pyrophyllite filler with polymers, studies were undertaken on the modification of pyrophyllite by encapsulation in a polymeric film. The polymerization of butyl methacrylate was carried out with the initiator 2,2'-azo-bis-isobutyrohydrazide adsorbed to the surface of pyrophyllite. The reaction was carried out at 343°K by adding butyl methacrylate and a surfactant to the primed pyrophyllite and raising the temperature to 370°K over a 15-25 min period; the polymerization proceeded at the latter temperature for 15-90 min. Free polymer was removed from the grafted polymer by extraction with hot benzene or toluene. The system was found suitable for modification of the pyrophyllite surface by radical polymerization of the unsaturated monomer to form a capsule layer. The polymer formed on the surface of pyrophyllite had a MW in the range of  $(6-10) \times 10^6$ , exceeding the MW of the polymer in solution ( $5 \times 10^5$ ). Figures 1; references 10: 6 Russian, 4 Western.  
[194-12172]

THERMAL DESTRUCTION OF MODIFIED POLYPROPYLENE FIBERS

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHESKIKH NAVUK in Russian  
No 5, Sep-Oct 85 (manuscript received 3 Dec 84) pp 68-73

YERMOLENKO, I.N., PARASKEVOVA, K.F., VLASOV, L.G., KACHURINA, N.V. and  
VIRNIK, R.B., Institute of General and Inorganic Chemistry, BSSR Academy of  
Sciences; All-Union Scientific Research Institute of Textile-Haberdashery  
Industry

[Abstract] The effect of temperature on destruction of polypropylene (PP) fibers containing different quantities of polyacrylic acid in hydrogen or in salt forms was studied. Experiments showed that on heating, these fibers are oxidized with oxygen. The salt forms are more thermally stable than the hydrogen forms. Other conditions being equal, thermal stability of the salt forms depends on the nature of the introduced anti-ion. The fiber-cation samples in hydrogen forms, or in the form of lanthanide salts (La, Gd, Lu), have higher thermal stability than adsorbents based on alkali metal salts. Figures 2; references 11: 10 Russian (1 by Western author), 1 Western.  
[216-7813]

UDC 547.239:620.179

EFFECT OF MODIFIERS ON STRUCTURE AND PROPERTIES OF FIBERS FROM  
POLYACRYLONITRILE

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHESKIKH NAVUK in Russian  
No 5, Sep-Oct 85 (manuscript received 4 Oct 83) pp 79-81

SYTSKO, V.Ye., Gomel Cooperative Institute

[Abstract] Metallylsulfonate and the biomass of microorganisms were suggested as replacements for expensive itaconic acid as modifiers of polyacrylonitrile fibers (PAN). The effect of these modifiers on molecular and supermolecular structures of PAN fibers was studied along with physical-mechanical properties of modified fibers using IR spectroscopy and x-ray diffraction analysis. The experimental results showed that these modifiers led to considerable improvement in wear resistance and in elasticity as well as to much less expensive end products. Figures 2; references: 3 (Russian).  
[216-7813]

## STUDY OF THERMAL STABILITY OF LAYERED CARBON FIBER COMPOUNDS WITH COPPER CHLORIDE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 9, Sep 85  
(manuscript received 6 Feb 84) pp 2145-2147

SKOROPANOV, A.S., KIZINA, T.A., KURNEVICH, G.I., LOYKO, E.M., FIALKOV, A.S.  
and VECHER, A.A.

[Abstract] Results are presented for the first time from a study of the behavior of layered carbon fiber compounds with  $\text{CuCl}_2$  based on graphitized viscose and polyacrylonitrile fibers in thermal interaction in comparison with data for layered graphite compounds with  $\text{CuCl}_2$  with the composition  $\text{C}_{6.35}\text{CuCl}_2$ . During heating of the substances studied, mass loss is observed at relatively low temperatures, 320-340 K in air, while at over 500 K the rate of the decomposition process is greatly increased, reaching a maximum of 0.66 %/K at 620 K. This results from the fact that water and other impurities are first liberated. At higher temperatures, copper chloride begins to be liberated from the graphitized areas, mostly as  $\text{CuCl}_2$ , sometimes as  $\text{Cu}_2\text{Cl}_2$ . The total mass loss corresponds to the content of the interstitial component, the carbon of the matrices remaining in its initial form. The layered carbon fiber compounds based on viscose and polyacrylonitrile fibers graphitized at 3,300 K with copper chloride are thus subject to thermal destruction beginning at relatively low temperatures. Figures 3; references 7: 6 Russian, 1 Western.  
[191-6508]

UDC 541.115:547.314.2'361.2

## RETARDATION AND INHIBITION OF THERMAL POLYMERIZATION OF VINYLACETYLENE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 38, No 8, Aug 85  
(manuscript received 8 Apr 85) pp 502-507

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[Abstract] The exothermic process of vinylacetylene polymerization frequently leads to explosions. In order to inhibit or diminish the possibility of an explosion in the synthesis of this polymer, various organic additives with high heat capacities were tested for their suitability in this system. Trials, conducted with retarding agents (xylene, toluene, benzene) and inhibitors (organic acids, aldehydes, alcohols), resulted in a calculated critical heat capacity of 66 cal/mole·degree centigrade. The latter represented the minimal heat capacity of the system below which the autocatalytic process of polymerization would result in an explosion, and

above which explosive decomposition of vinylacetylene was inhibited. The organic acids, alcohols, and aldehydes were more effective than the aromatic compounds in elevating the temperature of vinylacetylene decomposition. Figures 3; references 14: 10 Russian, 4 Western.  
[182-12172]

UDC 678.744

#### EMULSION POLYMERIZATION OF STYRENE WITH SURFACE ACTIVE MONOMERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 6, 1985  
(manuscript received 28 Dec 84) pp 1420-1422

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[Abstract] The feasibility of employing surface active monomers as emulsifiers capable of copolymerization with the base monomer in emulsion polymerization was previously demonstrated in the case of a cationic monomer-emulsifier. In the present work, a study was made of emulsion polymerization of styrene in the presence of anionic monomer-emulsifier dodecyl ester of para-potassium sulfonate-alpha-methyl-cinnamic acid. This substance is highly active at the water/air and water/styrene interfaces and is capable of stabilizing oil/water emulsions. Data show that styrene emulsions prepared in the presence of the above are highly dispersed, e.g., the mean diameter of the macrodroplets being 2-10  $\mu\text{m}$  and that of the microdroplets being 1800-2000Å. Study of the kinetics of the polymerization shows that the process takes place rapidly with no induction period. At 70% styrene conversion, the surface tension of the latex is almost equal to that of water. The use of a surface active monomer permits lowering the concentration of emulsifier while still maintaining the other characteristics of the process to give a latex of high stability. Figures 4; references: 7 (Russian)  
[183-12765]

SYNTHESIS OF ETHYLENE AND PROPYLENE OXIDE BLOCKCOPOLYMERS AND THEIR  
PHYSICAL CHEMICAL AND BIOLOGICAL PROPERTIES

Moscow KHMIIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 10, Oct 85  
(manuscript received 21 Aug 84) pp 1270-1274

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[Abstract] Ethylene and propylene oxide blockcopolymers (proxanols) were  
studied by NMR<sup>13</sup>C method determining their average molecular weight; their  
physical chemical and biological properties were evaluated along with the  
purification methods. Molecular weight of the blockcopolymer was an  
important characteristic determining their physical chemical properties.  
Polymer solubility depended on the solvent type and on temperature of  
solution. An assumption could be made that treatment of aqueous solutions  
of technical proxanol with various adsorbents could lower the concentration  
of polymer admixtures and thus decrease its toxicity. Figures 4;  
references 6: 4 Russian, 2 Western.  
[205-7813]

POLYVILOGENES

Riga KHMIIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 9, Sep 85  
(manuscript received 26 Feb 85) pp 1268-1269

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K. Khetagurov, Ordzhonikidze

[Abstract] Two polymers, poly-N,N'-n-xyxylene-4,4-dipyridinedichloride (I)  
and poly-N,N'-hexamethylene-2,2,6,6-tetraphenyl-4,4-dipyridinedichloride (II),  
with viologenic units in the primary chain, were prepared. After reprecipi-  
tation, both substances are almost colorless amorphous powders that are  
insoluble in acetonitril, but soluble in DMFA, acetic acid, and water.  
Their molecular weights are 1340 for (I) and 2200 for (II). Both compounds  
enter into redox-reactions characteristic of viologenes. Electronic para-  
magnetic resonance spectrums revealed absence of a noticeable spin-spin  
interaction between the individual paramagnetic units in the primary chain.  
The electrochemical properties of the two polymers were studied using  
cyclical voltamperometry. Figures 1; references 2; 1 Russian, 1 Western.  
[160-13050]

CARBON DIOXIDE CONVERSION OF METHANE IN MICROWAVE PLASMA

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHESKIKH NAVUK in Russian  
No 5 Sep-Oct 85 (manuscript received 1 Apr 85) pp 3-5

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[Abstract] Experimental results are reported of the investigation of stable products composition obtained in CO<sub>2</sub> conversion of methane in microwave (UHF) discharge (MWD) plasma in relationship to the composition of starting mixture. Experiments were performed on a specially-designed equipment based on the generator "Fialka." Plasma burned in a stable fashion while the pressure in the reactor was maintained at 14.6 kPa and the CH<sub>4</sub>:CO<sub>2</sub> ratio at 0.05; when the CH<sub>4</sub>:CO<sub>2</sub> ratio was elevated to 1, the pressure in the reactor was dropped to 13.3 kPa. After conversion, the gaseous mixture in the reactor consisted of CO<sub>2</sub>, CH<sub>4</sub>, O<sub>2</sub>, CO, and H<sub>2</sub>. When the initial methane fraction exceeded 50%, excessive carbon evolution was observed leading to either an explosion on the reactor walls or to an interruption of the discharge. These experiments showed that MWD is an effective method for producing synthesis-gas by the CO<sub>2</sub> conversion of methane. Figures 2; references: 3 (Russian).  
[216-7813]

PHOTOGRAPHIC SENSITIVITY OF CATION-EXCHANGE CELLULOSE ESTERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 9, Sep 85  
(manuscript received 30 Jul 84) pp 2083-2089

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[Abstract] The purpose of this work was to determine the photographic and spectral sensitivity of certain cation exchange derivatives of cellulose in acid or salt forms, and the influence of the content of acid groups on the process of image formation. Acid cellulose esters containing various acid groups were used: carboxymethylcellulose, citric acid, tartaric acid, and phosphoric-acid esters of cellulose, EDTA-cellulose, and sulfoethyl-cellulose were used in the study. The cellulose esters were found to form latent image centers under the influence of ultraviolet radiation, which could be developed with an increase in the effect of the physical developer, indicating the possibility of using cellulose esters as photographic materials. The light sensitivity of the cellulose esters shows a maximum when plotted as a function of the content of acid groups and degree of substitution of silver ions both when exposed in the H form and in the Ag form. Maximum light sensitivity and selectivity of development are observed for carboxymethylcellulose with  $C_{COOH}=1.2$  and citric acid cellulose ester 2.5 mass% with silver ion substitution 0.1-0.2. The phenomena observed are explained by the participation of the acid groups in the process of image formation. Figures 3; references: 10 (Russian).  
[191-6508]

MODEL OF DISPARATE DIAMONDROID AMORPHOUS STRUCTURE (DAAS) AND SIGNIFICANCE OF POSSIBILITY OF FORMATION OF MICROINCLUSIONS OF DAAS IN NONDISLOCATED SILICON

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 6, 1985 (manuscript received 30 Jul 85) pp 1392-1396

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[Abstract] Models of diamondoid amorphous structure (DAAS) may be constructed by multitwinning of tetrahedral crystals (modulus) to form quintary cycles, or by packing linear defects into a crystal to such a density that each atom of the matrix is included in the nucleus of the defect. The most suitable linear defect for modeling diamondoid amorphous structures is clinodisparity, or disparity with a large clino component. The spiral axes of symmetry in the Si atom preclude spherical symmetry of the atoms, so that if dislocations are imparted to the matrix, the orientation of these atoms changes spasmodically, resulting in disruption of uniformity through ruptured bonds in the nucleus of the defect. Translational and rotational ( $60^\circ$ ) dislocations are possible in direction (111) (axis  $6_3$ ) which correspond to clinodisparity and which preserve continuous orientation change in two types of polar-oriented tetrahedral Si atoms. In linear defects not related to packing defects, minimum perimeter Burgher contours are contained entirely within the nucleus defect, so that it is possible to create dislocations corresponding to some particular linear defect directly on a repeating modulus of the matrix and converting it into a modulus of the defect nucleus. The role of disparate diamondoid amorphous structure in non-dislocated Si may be significant. Formation of  $\text{SiO}_2$  is entirely possible during oxidation of microinclusions of DAAS not stabilized with carbon. Figures 4; references 10: 8 Russian, 2 Western. [183-12765]

OXIDATION OF KIMBERLITE DIAMONDS BY MIXTURES OF CARBON DIOXIDE AND WATER VAPOR

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2, KHIMIYA in Russian  
Vol 26, No 5, Sep-Oct 85 (manuscript received 18 Jun 84) pp 497-501

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[Abstract] A study is reported of the mutual influence of carbon dioxide and water vapor on their oxidative action on diamond. Studies were performed in a quartz flow-through installation at 900-1045°C using melted potassium hydroxide as the catalyst. A platinum insert reactor prevented contact of the diamonds and catalyst with the quartz. The joint action of the two oxidizers, water vapor and carbon dioxide, on the diamond was such that small quantities of either one of them decreased the oxidizing capacity of the other, so that over a broad range of composition, the oxidizing capacity of their mixtures remained constant. Carbon dioxide inhibits oxidation of diamond by water vapor and vice versa. Figures 2; references: 8 (Russian).  
181-6508]

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